A330
TECHNICAL TRAINING MANUAL
MECHANICAL & AVIONICS COURSE - T1+T2 (LVL 2&3)
(RR Trent 700)
COMMUNICATIONS

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COMMUNICATIONS

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COMMUNICATIONS SYSTEM LINE MAINTENANCE BRIEFING (2)

SYSTEM OVERVIEW

The use of the radio system on the Long Range aircraft is extremely important for the safe operation of the aircraft. While taxiing and towing, communication is necessary with the tower to safely move the aircraft. Basic system description and procedures will enable the student to understand system interconnection and correctly operate the systems by selecting frequencies and setting transmission and reception modes. In addition, the use of the service interphone communications will also be explained. The panels and equipment that will be explained is as follows:
- Audio Control Panel (ACP),
- Radio Management Panel (RMP),
- Audio Management Unit (AMU),
- radio transceivers,
- acoustic equipment that includes: boomsets, hand mikes, and handsets.

RMP FREQUENCY SELECTION

The RMP is the digital tuning head for the communications transceivers. They are located in the center pedestal and in the overhead panel for the 3rd observer seat. The panels have an over center ON/OFF switch. When the ON/OFF switch is switched to the ON position, two frequencies that were previously selected appear in the ACTIVE and STandBY windows. To operate the transceiver, you might have to select a new frequency on one of the Very High Frequency (VHF) or High Frequency (HF) transceivers. To do this, you must select the transceiver that you wish to transmit on. To select the radio, the related radio P/B must be pushed on the RMP. The related green Light Emitting Diode (LED) will come on.

ACP TRANSMISSION MODE SELECTION

To connect one of the acoustical devices (microphone) to the transmission line, the related transmission key must be selected on the ACP. When the transmission key is pressed (green light on) you are ready to transmit. This selection can be disabled when you select another transceiver or when you press the lighted P/B again. Only one transmit key can be selected at a time.

ACP RECEPTION MODE SELECTION

In order to listen on the selected transceiver, you must operate the ACP. On the ACP, the reception knobs allows connection of the headsets / acoustic equipment to the transceiver reception via the AMU. To select a transceiver, the related reception knob must be released out. The reception knob comes on white. To adjust the reception volume level, the selected reception knob must be turned. Communications can now be established.

ACP OPERATION

When one of the Push-to-Talk (PTT) switches is depressed, the hand mike is connected, and in this case, the VHF 1 transceiver transmits. The boomset mike is connected when a PTT is pressed in on the ACP or on the side stick. On the ACP, several reception knobs can be selected simultaneously. If the reception knob is pressed in again, the receiver is disconnected and the white light goes off.

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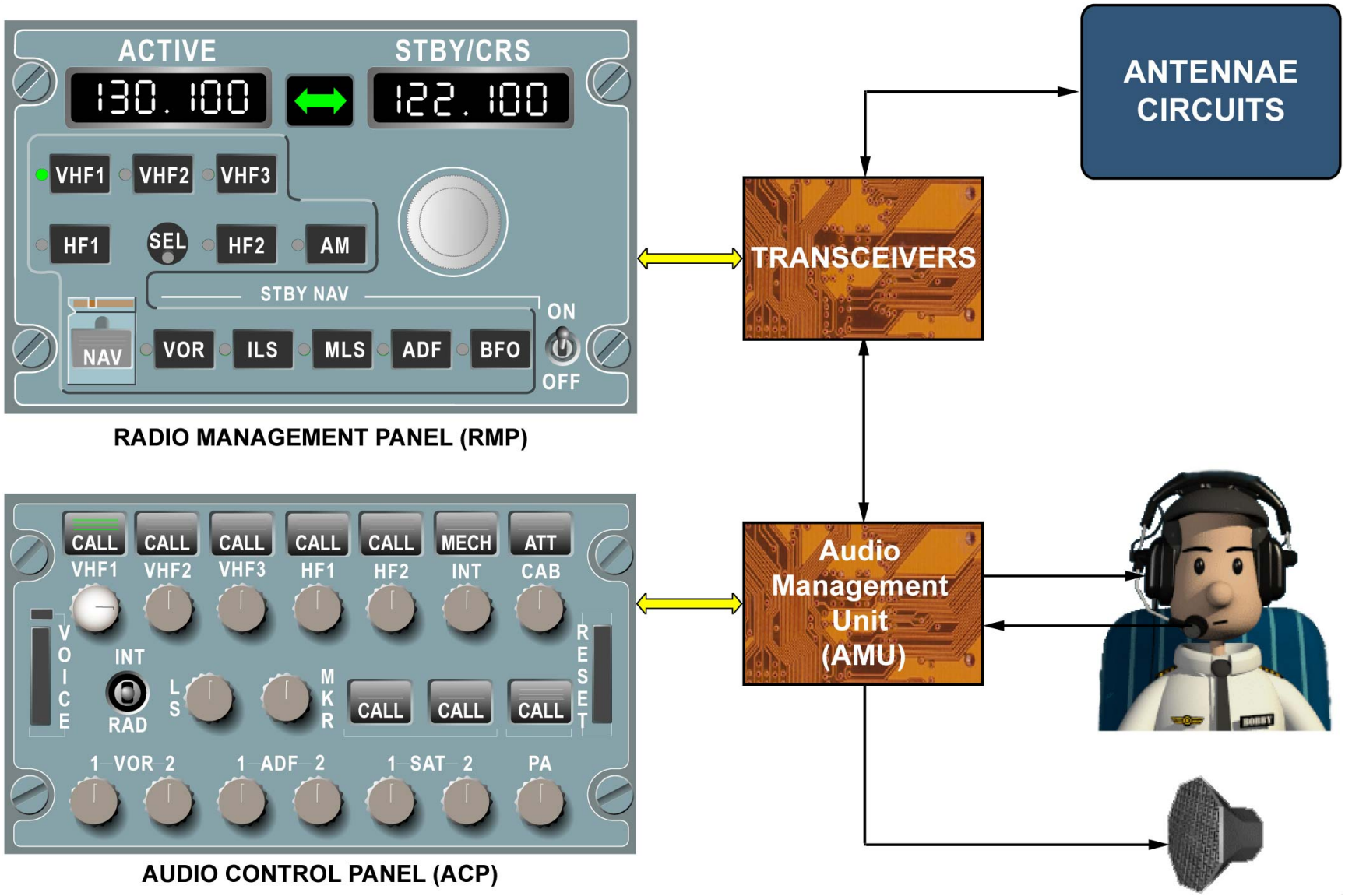

SYSTEM OVERVIEW - RMP FREQUENCY SELECTION ... ACP OPERATION

COMMUNICATIONS SYSTEM LINE MAINTENANCE BRIEFING (2)

SYSTEM OVERVIEW (continued)

FLIGHT INTERPHONE SYSTEM OPERATION

Flight interphone selection is necessary for voice communications between flight crewmembers and for ground handling, taxiing and towing. This control is done using the ACP. If the flight crew needs to maintain the contact and communicate with the mechanic, the flight crew can push the MECHanic P/B on the CALLS panel on the overhead. The flight interphone can also act as a transceiver. Selection of the INTerphone transmission key lights the green bars, indicating that the flight interphone is ready to operate. Pressing and releasing the INT reception knob causes the knob to come on and adjusts the interphone audio level. The INTerphone/RADio selector switch must be in the INT position. The INT position gives a permanent use of the flight interphone without any further reaction and whatever radio key selected. The INT/RAD switch is a 3-position switch with INT being a stable position. The RAD selection connects the pre-selected channel to transmit. The RAD position is a momentary contact, and is spring loaded to the center position. This position acts like the selection of the hand microphone pushbutton or the PTT trigger on the side-stick.

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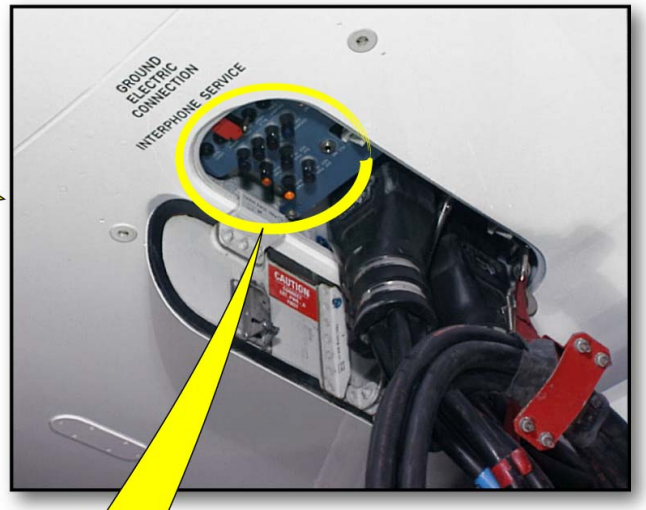
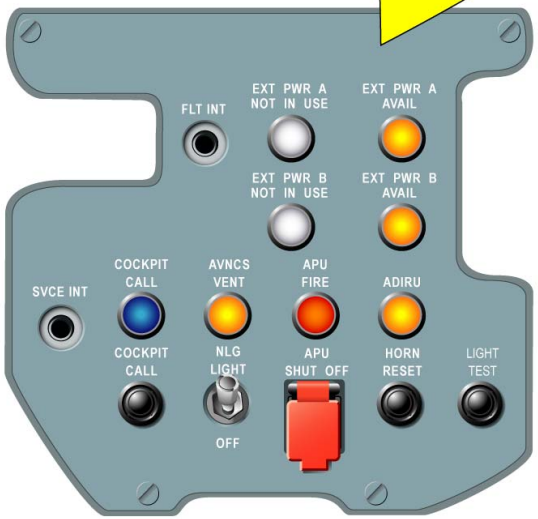
NOSE LANDING GEAR

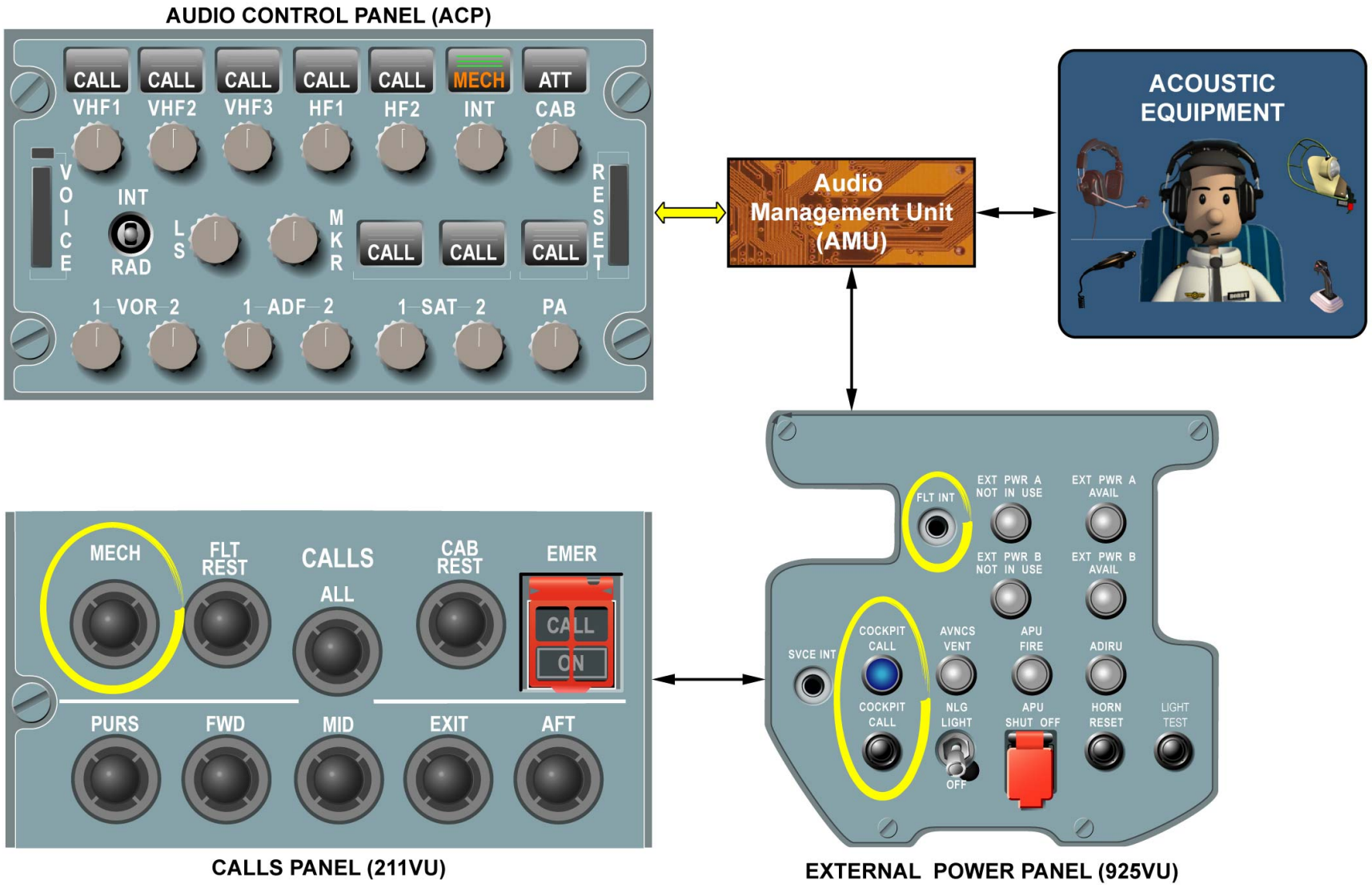


During storm conditions or when there is atmospheric electrical activity, it is recommended to remove/disconnect headsets.



EXTERNAL POWER CONTROL PANEL (925VU)

SYSTEM OVERVIEW - FLIGHT INTERPHONE SYSTEM OPERATION



SYSTEM OVERVIEW - FLIGHT INTERPHONE SYSTEM OPERATION

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COMMUNICATIONS SYSTEM LINE MAINTENANCE BRIEFING (2)

SYSTEM OVERVIEW (continued)

SERVICE INTERPHONE SYSTEM OPERATION

The service interphone system has several service interphone jacks installed around the aircraft to make easier communications between maintenance personnel during troubleshooting, and between maintenance and flight crew when doing coordinated tasks; i.e. manual start valve operation.
The audio lines from the cockpit, cabin and interphone jacks are routed to the amplifiers through the amplifiers in the Cabin Intercommunication and Data System (CIDS) directors. The system is integrated in the CIDS directors. There are 2 modes to connect the jacks to the service interphone. The automatic mode on ground only with the landing gear down and compressed OR the external power contactor connected. The other mode is mentioned in the MAINTENANCE TIPS section.

SERVICE AND FLIGHT INTERPHONE OPERATION

Selecting the CAB INT transmission key and reception knob on the ACP makes a connexion between the service and the flight interphone.

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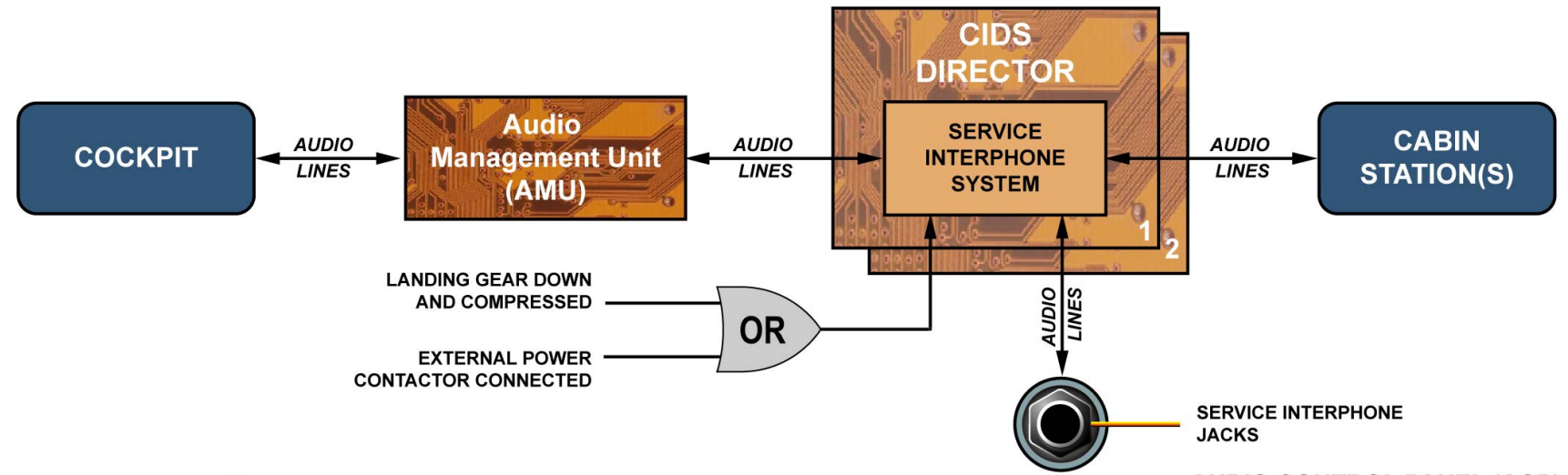

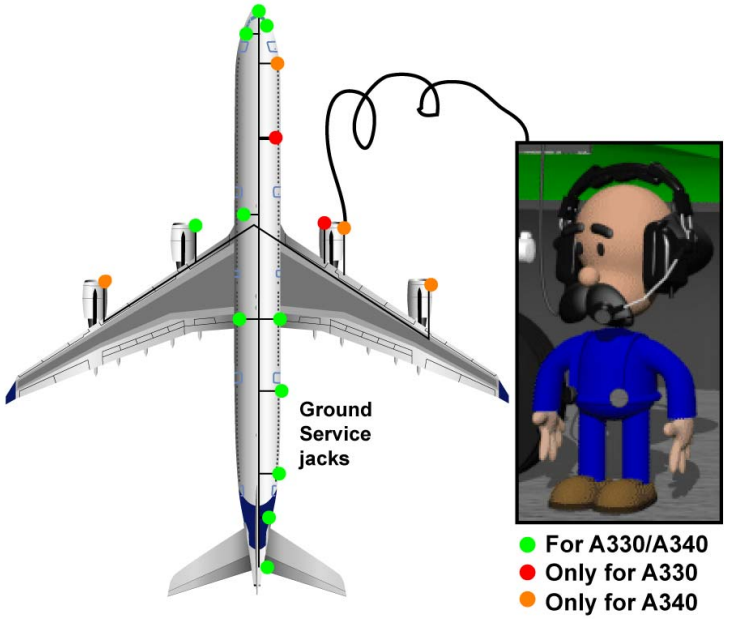

AUDIO CONTROL PANEL (ACP)

The CABIN INTERPHONE selector on the Audio Control Panels (ACPs) establishes flight and service interphone operation.

CIDS: CabIn Intercommunication Data System

SYSTEM OVERVIEW - SERVICE INTERPHONE SYSTEM OPERATION & SERVICE AND FLIGHT INTERPHONE OPERATION

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COMMUNICATIONS SYSTEM LINE MAINTENANCE BRIEFING (2)

MAINTENANCE TIPS

SERVICE INTERPHONE INOPERATIVE ON THE GROUND

On ground, the service interphone is automatically selected on. In flight, the service interphone system is automatically selected off. The reason is to remove/stop potential static noise generated and amplified through the AMU, due to the length of wires acting as antennae, in the audio system. For maintenance tasks on ground and depending on the aircraft maintenance configuration, the service interphone can be lost. To restore the service interphone function, the SerViCE INTerphone OVeRriDe P/BSW must be switched to 'ON'. The guarded SVCE INT OVRD P/BSW is located on the cockpit overhead maintenance panel.

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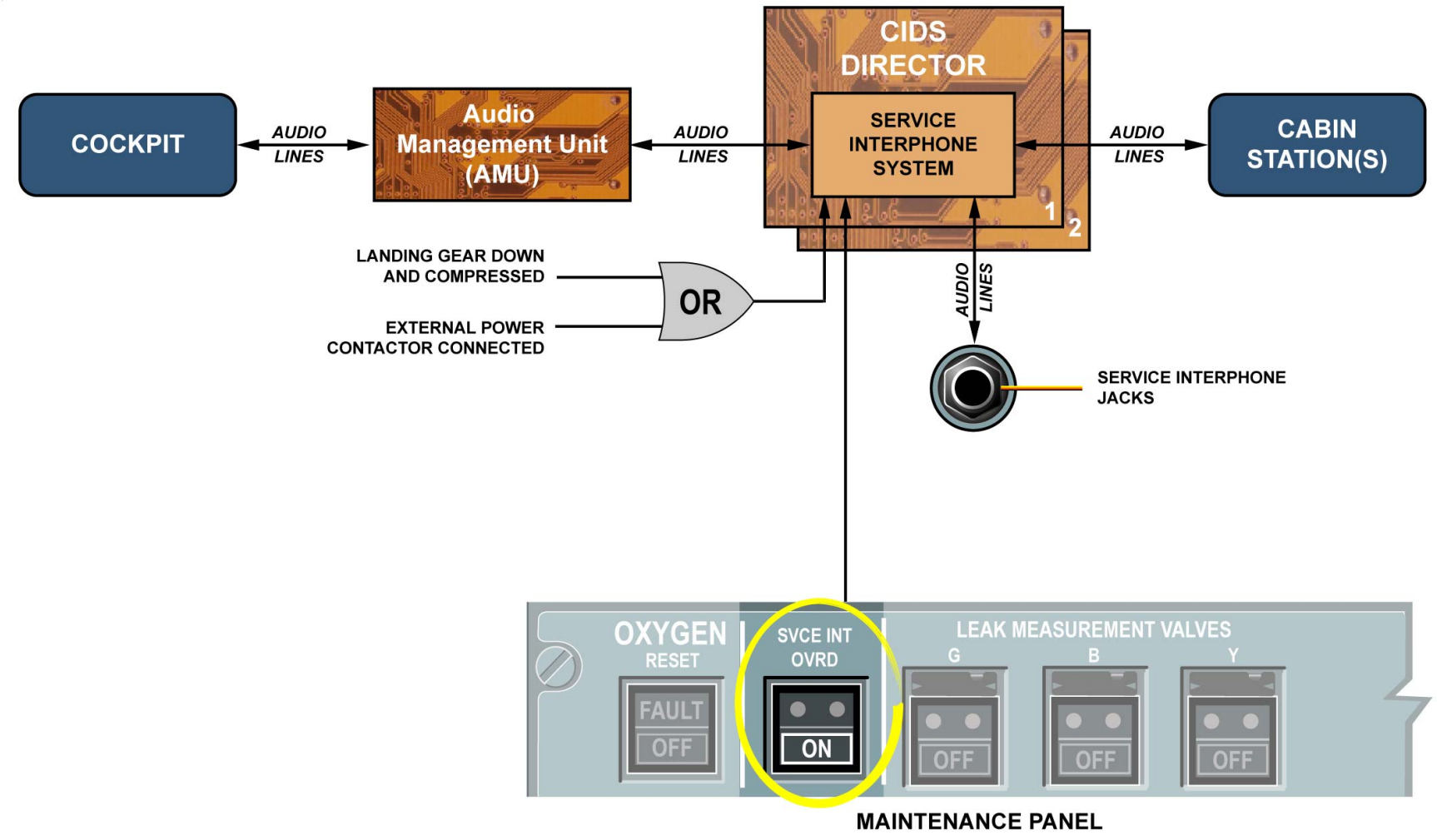

CIDS: CabIn Intercommunication Data System

MAINTENANCE TIPS - SERVICE INTERPHONE INOPERATIVE ON THE GROUND

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COMMUNICATIONS SYSTEM LINE MAINTENANCE BRIEFING (2)

MAINTENANCE TIPS (continued)

CABIN & SERVICE INTERPHONE OPERATION

Pressing the INT key twice, on the attendant handset, activates the service interphone function. A display, on the Attendant Indicating Panel (AIP), indicates that the service interphone is in use.

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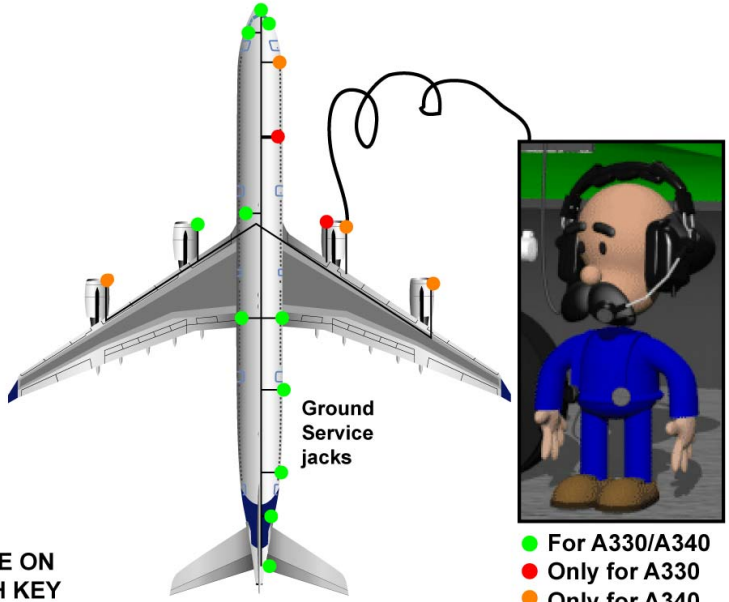
MAINTENANCE AREA JACK

SERVICE INTERPHONE JACK



PUSH TWICE ON
INTPH KEY

CABIN HANDSET

ATTENDANT INDICATION PANEL

MAINTENANCE TIPS - CABIN & SERVICE INTERPHONE OPERATION

COMMUNICATIONS SYSTEM LINE MAINTENANCE BRIEFING (2)

MAINTENANCE TIPS (continued)

VHF COMMUNICATION ON BATTERIES ONLY

With the aircraft only supplied by batteries, of the three VHF systems, only the VHF 1 transceiver, CAPT ACP 1 and CAPT RMP 1 can operate. Moreover, as the VHF1 antenna is installed above the cockpit and due to the size of the Long Range aircraft, it is recommended to use this system on ground for line of sight transmission.

NOTE: Note: The international emergency frequency, 121.5 MHz, must not be used for normal communication.

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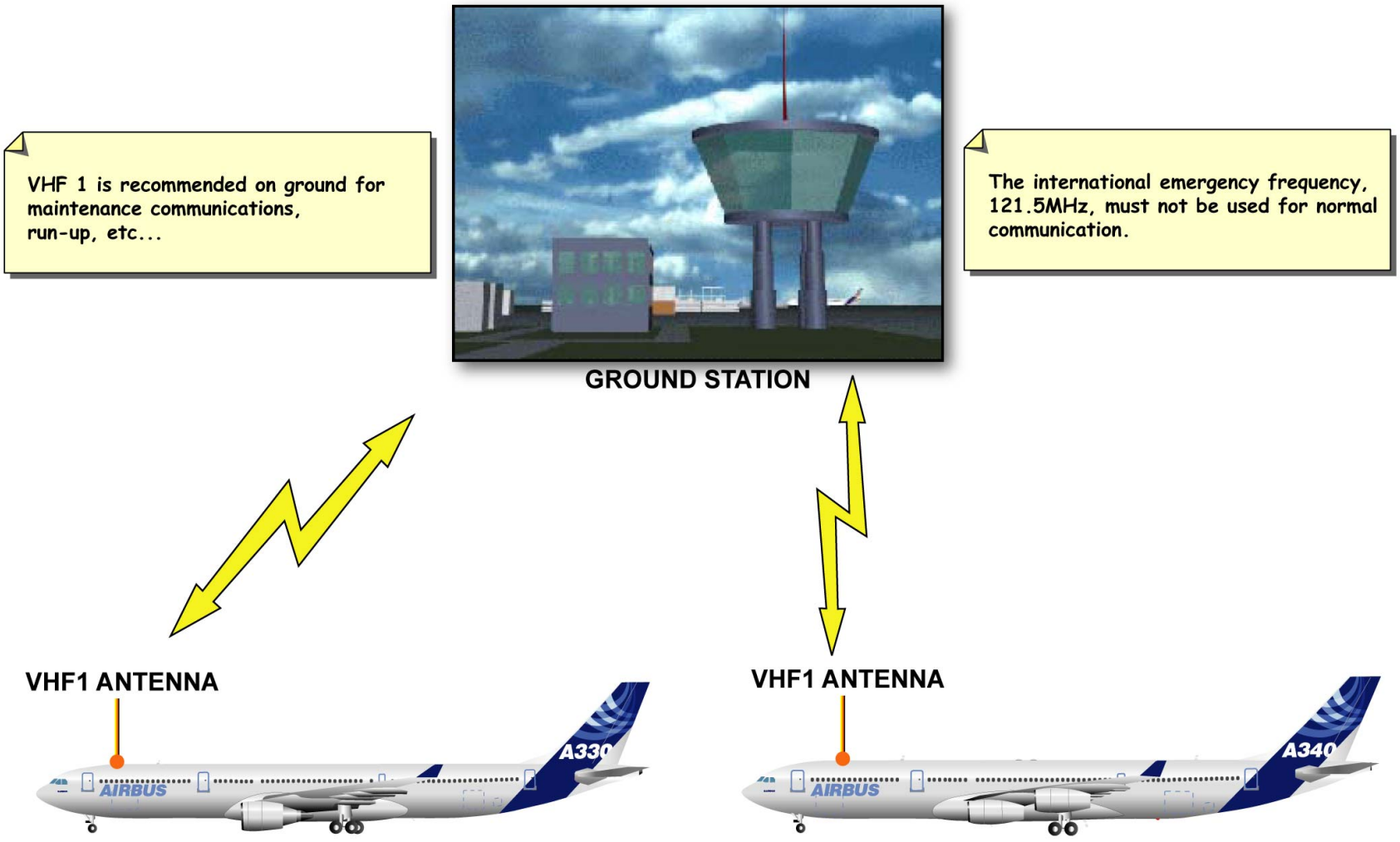


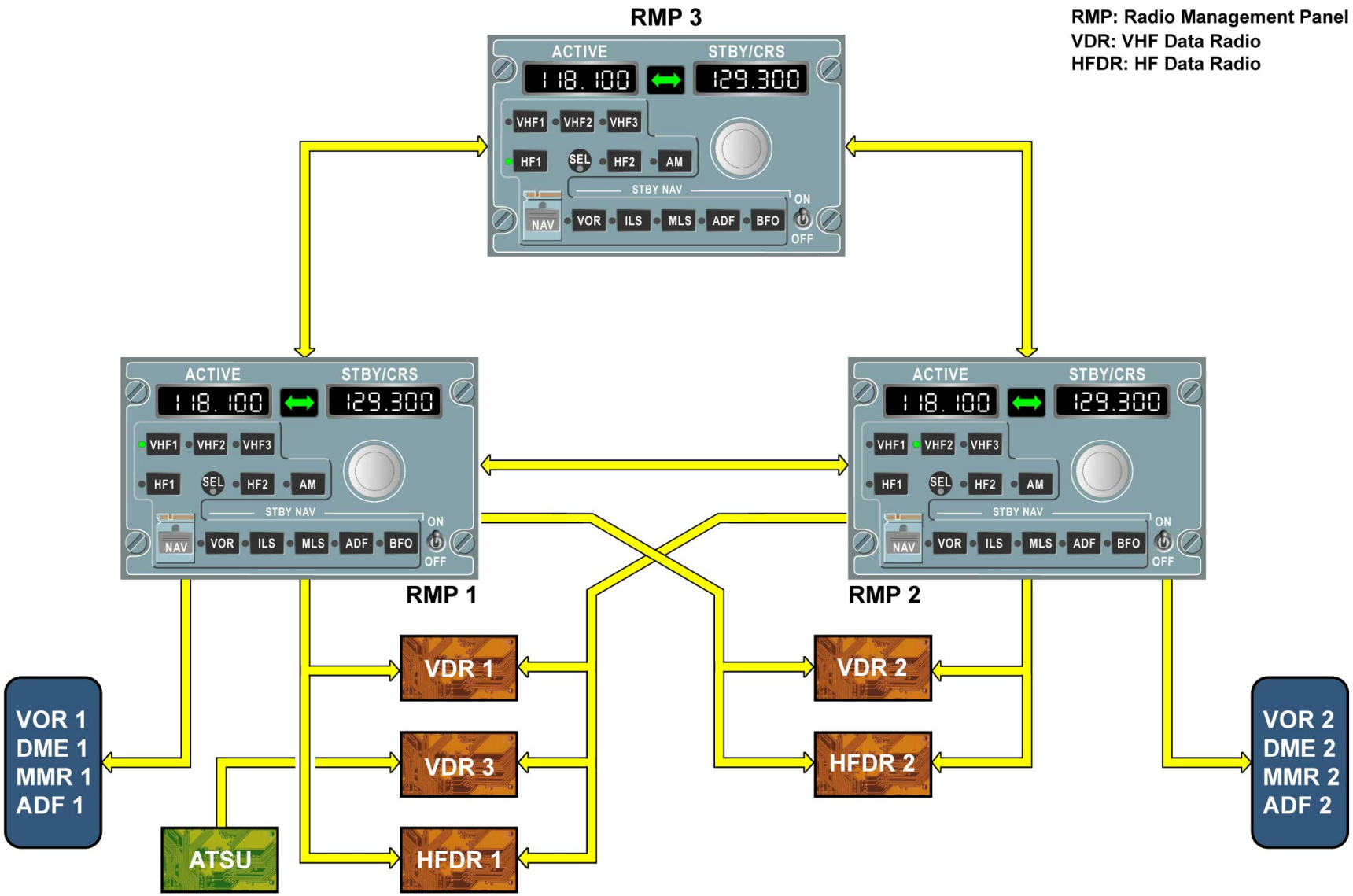
MAINTENANCE TIPS - VHF COMMUNICATION ON BATTERIES ONLY

RADIO MANAGEMENT D/O (3)

COMMUNICATION ARCHITECTURE

There are three Radio Management Panels (RMPs) used for frequency selection of the different HF and VHF transceivers. The architecture of the radio management system enables the three RMPs to permanently dialog between each other. Thus, each RMP can control any of the radio transceivers. If at least one RMP is available, all HF and VHF transceivers can be controlled. The RMP1 and RMP2 are directly connected to all the HF and VHF radio transceivers. The RMP3 is only connected to the RMP1 and RMP 2. Only the RMP 1 and RMP 2 can control the radio navigation systems in back-up mode when the Flight Management Guidance and Envelope Computers (FMGECs) have failed.
Each RMP is normally dedicated to controlling a particular radio:
- RMP 1 is dedicated to the VHF Data Radio transceiver 1 (VDR 1),
- RMP 2 is dedicated to VDR 2,
- RMP 3 is dedicated to VDR 3 and the two HF Data Radio transceivers, HFDR 1 and HFDR 2.

If an RMP takes control of a non-dedicated transceiver, the SELector light will come on white on this RMP and on the RMP dedicated to the selected transceiver.



COMMUNICATION ARCHITECTURE

RADIO MANAGEMENT D/O (3)

DESCRIPTION

RMP 1 and RMP 2 have two ARINC 429 data buses connected to the radio communication transceivers:
- COM BUS 1 delivers the VDR 1, VDR 3 and HFDR 1 frequencies,
- COM BUS 2 delivers the VDR 2 and HFDR 2 frequencies.

Three dialog buses make sure that the exchange of information between the three RMPs is done. Each RMP periodically transmits its context on its dialog bus. The RMP 3 controls the radio communication transceivers through dialog buses and RMP 1 and RMP 2. PORT SELECT DISCRETE lines determine which port (A or B) is active.
The
RMP 1 is allocated to the VDR 1, the RMP 2 is allocated to the VDR 2 and the RMP 3 is allocated to VDR 3, HFDR 1 and HFDR 2. Each time the system operates in a different configuration, the SEL indicator on the involved RMPs comes on. The Air Traffic Service Unit (ATSU) controls VDR 3 frequencies through PORT A. The port select discrete is controlled by the ATSU.
The RMP 1 is connected to the Central Maintenance System (CMS) through the Central Maintenance Computer (CMC). The CMC sends the option status defined by means of the pin programming, to the RMPs. In order to increment the flight leg, the Landing Gear Control and Interface Unit (LGCIU) 1 is connected to RMP 1 and LGCIU 2 is connected to RMP 2 and RMP 3. In the event of RMP 1 failure, the RMP 3 becomes the main unit for BITE information. If only RMP 2 is available, communication with the CMC is lost.

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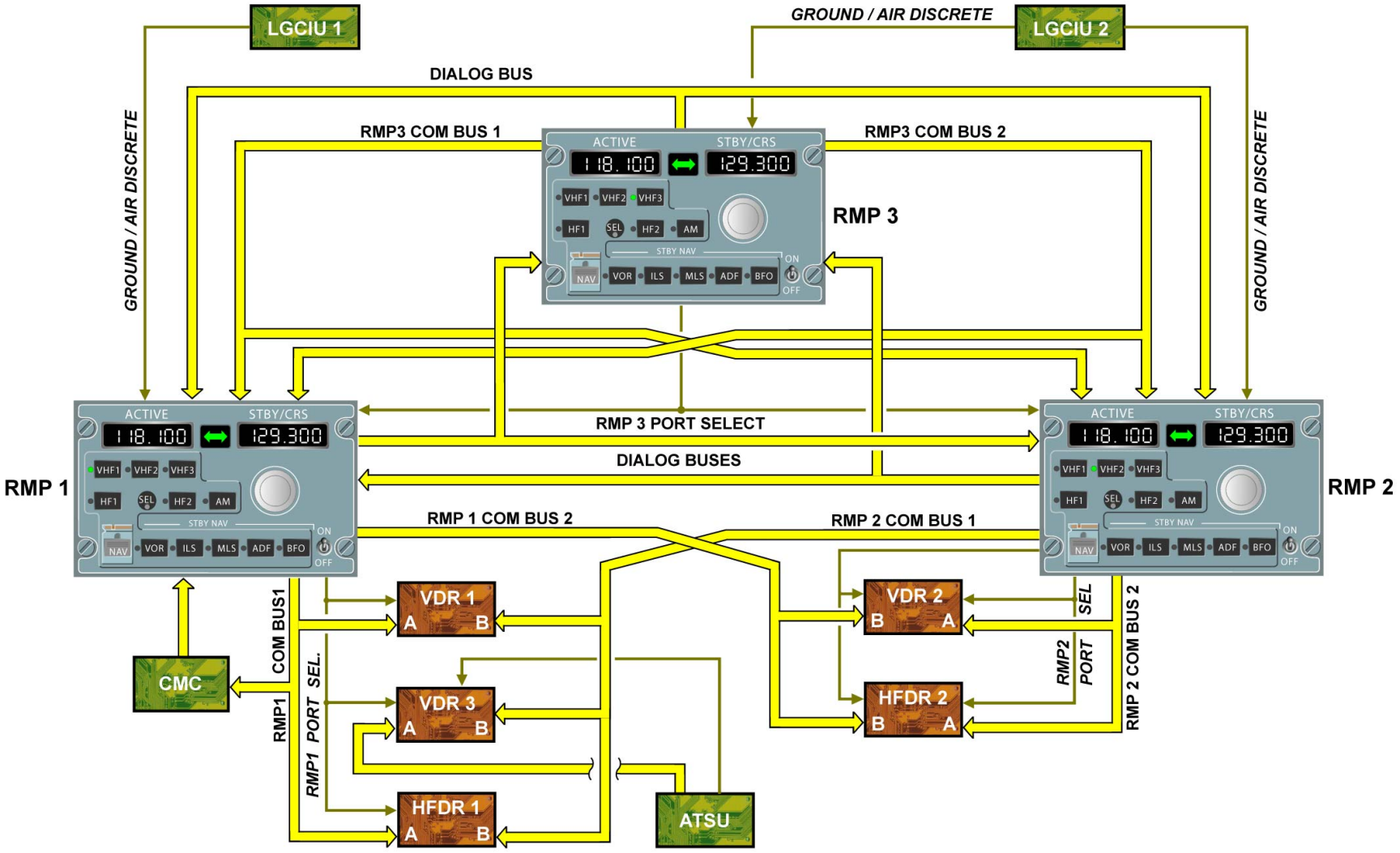

DESCRIPTION

RADIO MANAGEMENT D/O (3)

OPERATION

NORMAL OPERATION

In normal configuration, the RMP 3 sends frequencies to the radio communication transceivers via its dialog buses and through RMP 1 and RMP 2. In normal operation, RMP 1 and RMP 2 send frequencies to PORT A radio communication transceivers (except for VDR3). ATSU is linked to the port A of the VDR3 for data mode and port B is used for voice mode.

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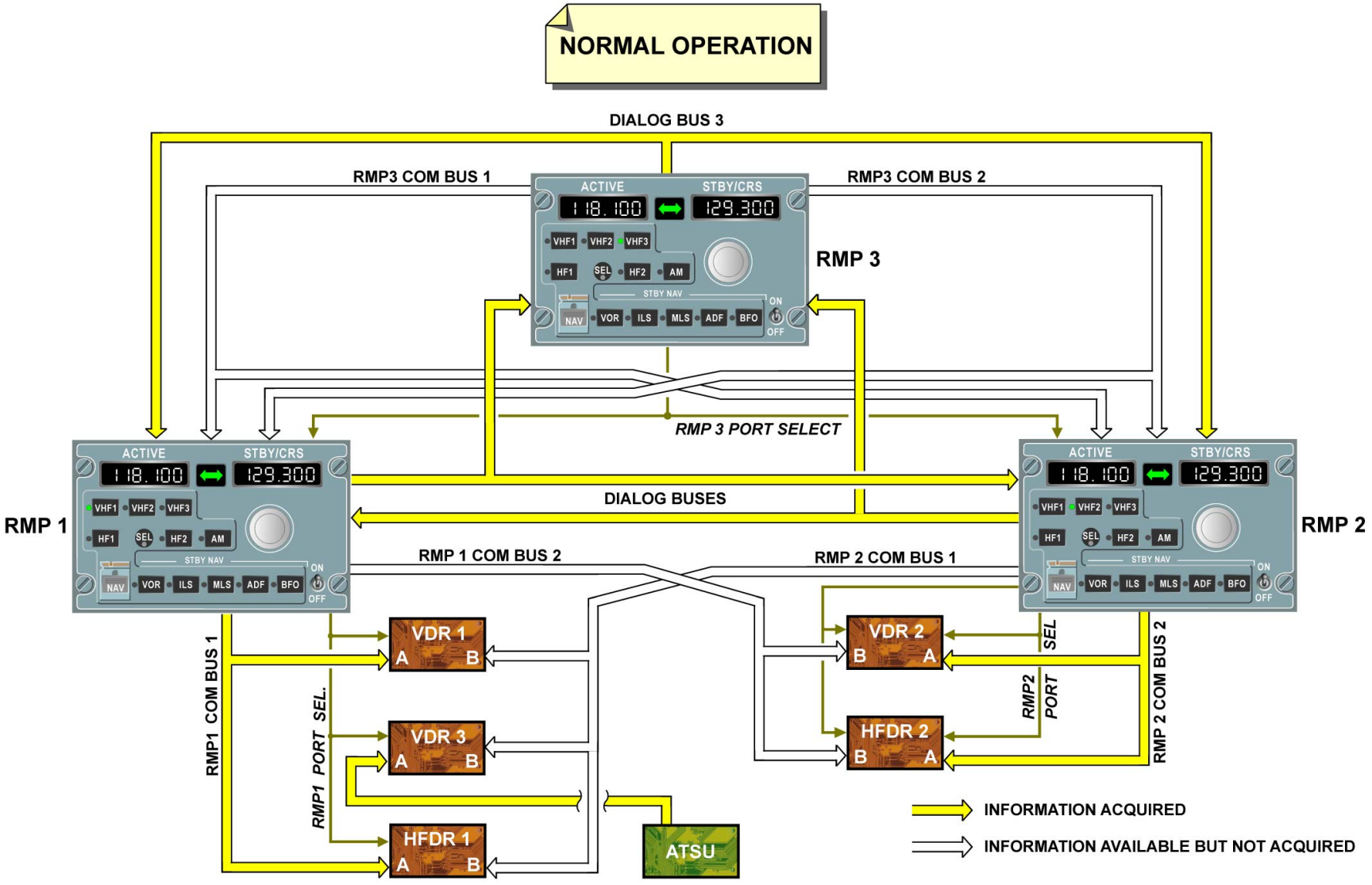

OPERATION - NORMAL OPERATION

RADIO MANAGEMENT D/O (3)

OPERATION (continued)

RECONFIGURATION

In case of failure of one RMP, the other RMPs control all the radio communication transceivers via their dialog buses and through RMP 1 and RMP 2. When one RMP is defective, the displays become blank. Switching it (the display) OFF can let the control of the onside radio communication transceivers operate from the other RMPs.
If RMP 1 and RMP 2 fail, RMP 3 controls all the radio communication transceivers (VHF and HF).
In case of RMP 2 and RMP 3 failure, RMP 2 PORT DISCRETE selects PORT B on the side 2 transceivers. In this case, RMP 1 controls all the radio communication transceivers. In case of RMP 1 and RMP 3 failure, RMP 1 COM DISCRETE selects PORT B on the side 1 transceivers.

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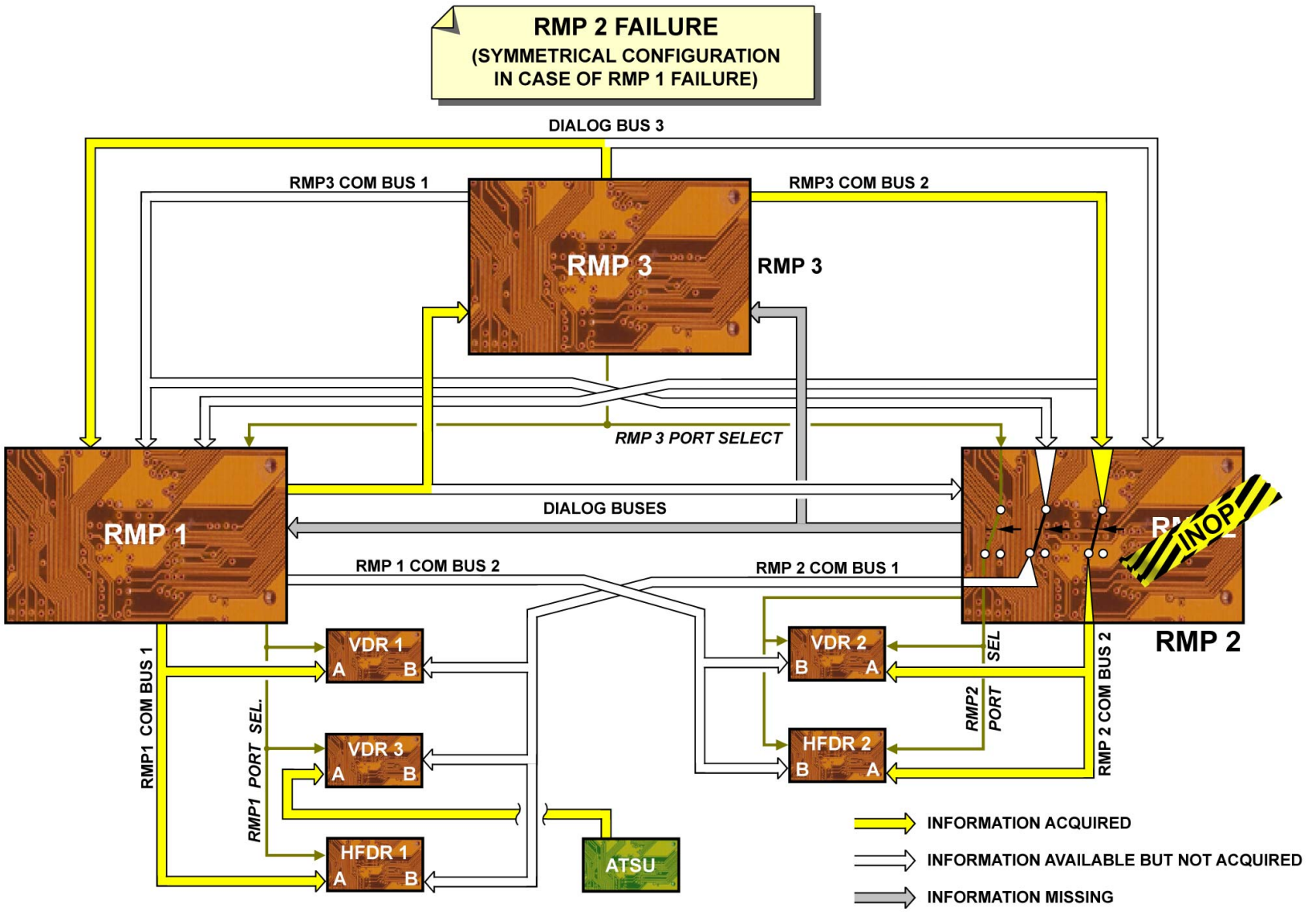

OPERATION - RECONFIGURATION

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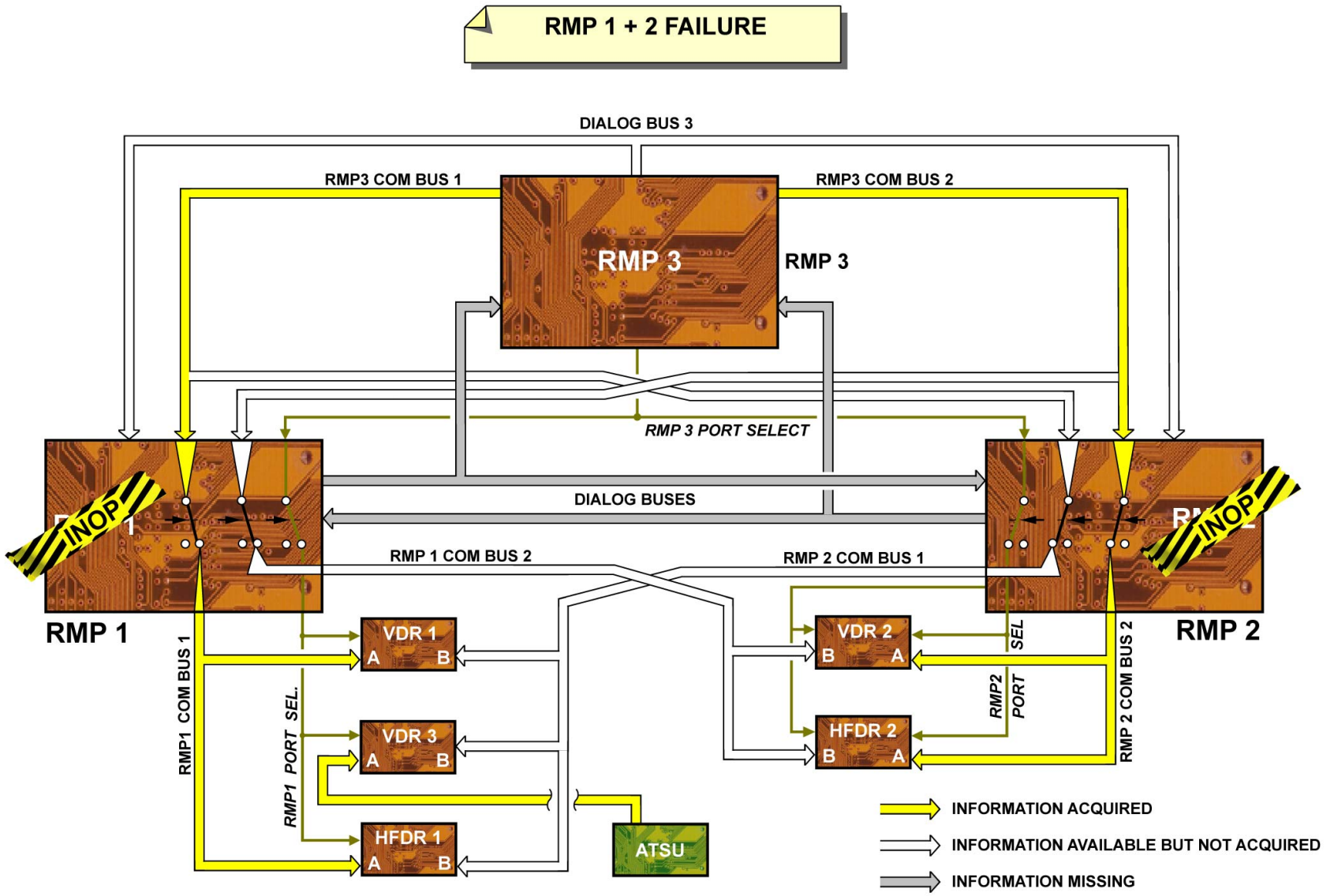

OPERATION - RECONFIGURATION

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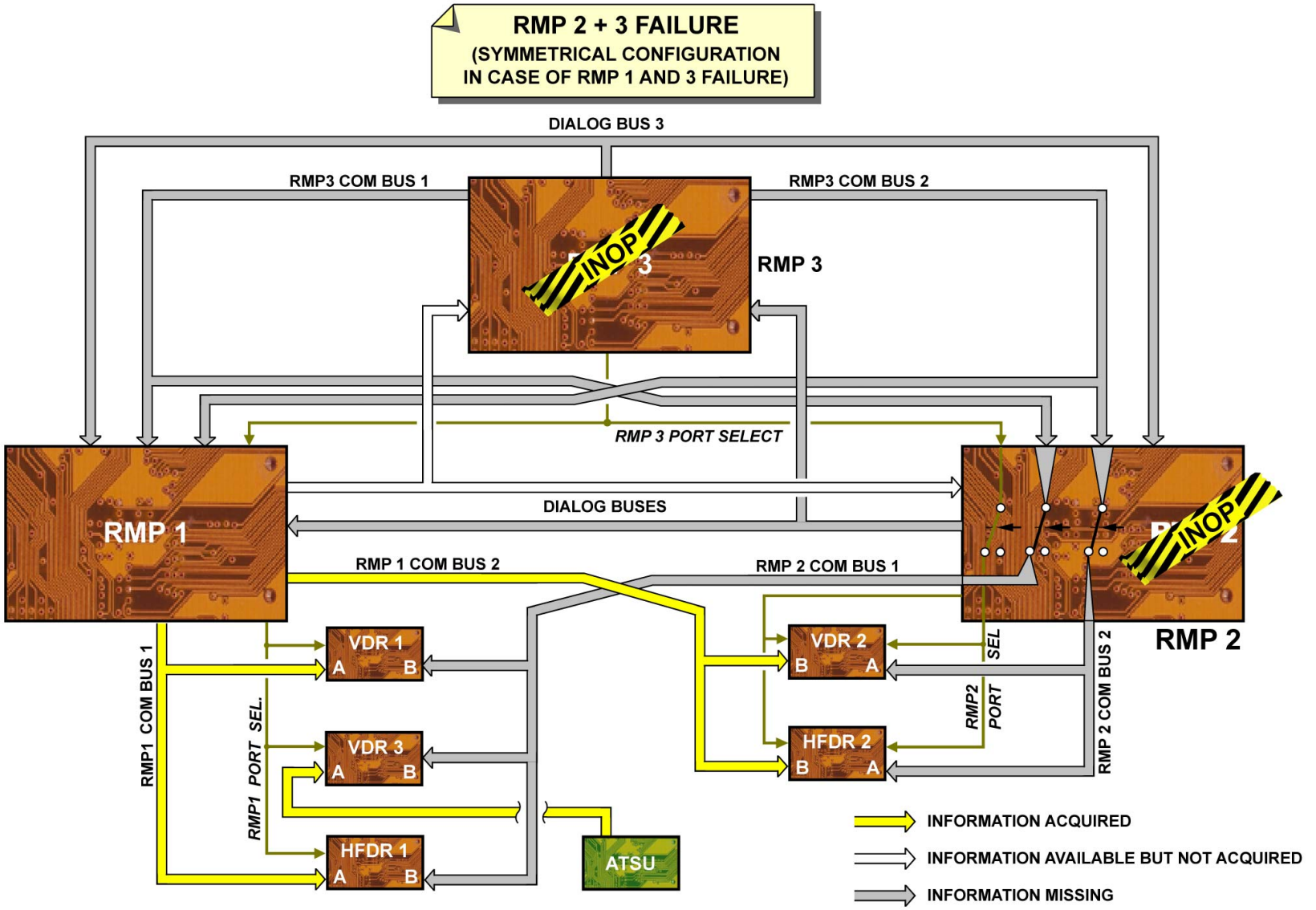

OPERATION - RECONFIGURATION

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HF D/O (3)

GENERAL

The High Frequency (HF) system allows long distance voice communications between A/C (in flight or on ground), or between the A/C and a ground station. The HF system is comprised of:
- 2 High Frequency Data Radio (HFDR) transceivers,
- 2 HFDR couplers,
- 1 shunt-type antenna.

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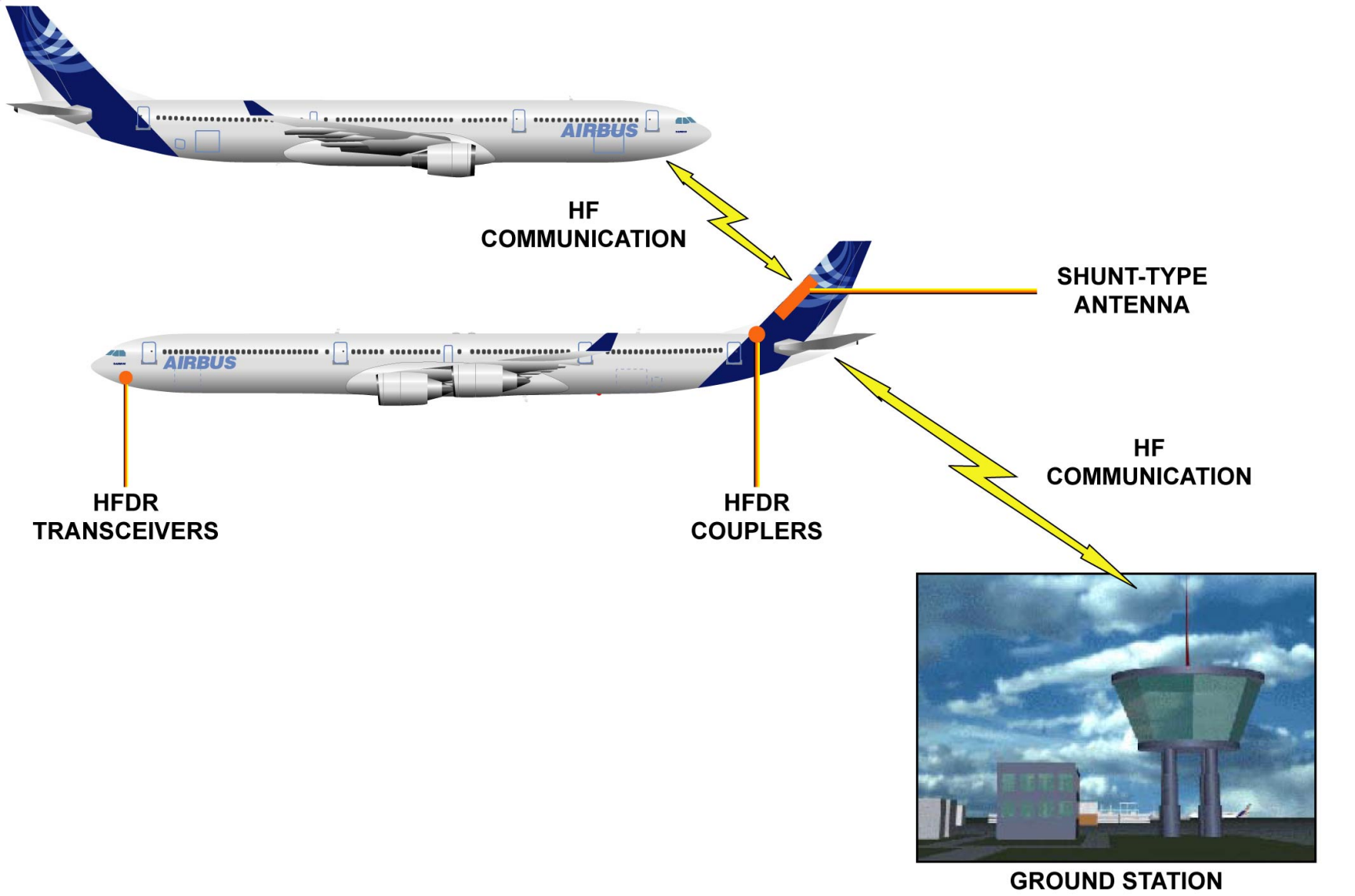
HF
COMMUNICATION
SHUNT-TYPE
ANTENNA
HF
COMMUNICATION
HFDR
TRANSCEIVERS
HFDR
COUPLERS
GROUND STATION

GENERAL

HF D/O (3)

MAIN COMPONENTS OF THE HF SYSTEM

The main components of the HF system are:
- the HFDR 1/2 transceivers,
- the HFDR 1/2 coupler, which provides impedance matching between the HF shunt-type antenna and the transceiver,
- the HF shunt-type antenna,
- the Radio Management Panels (RMPs),
- the Audio Management Unit (AMU),
- the Audio Control Panels (ACPs),
- the acoustic equipment, which is composed of 2 side-stick radio selectors, 2 loudspeakers, 3 oxygen mask microphones, facilities for boomsets, headsets and hand microphones.

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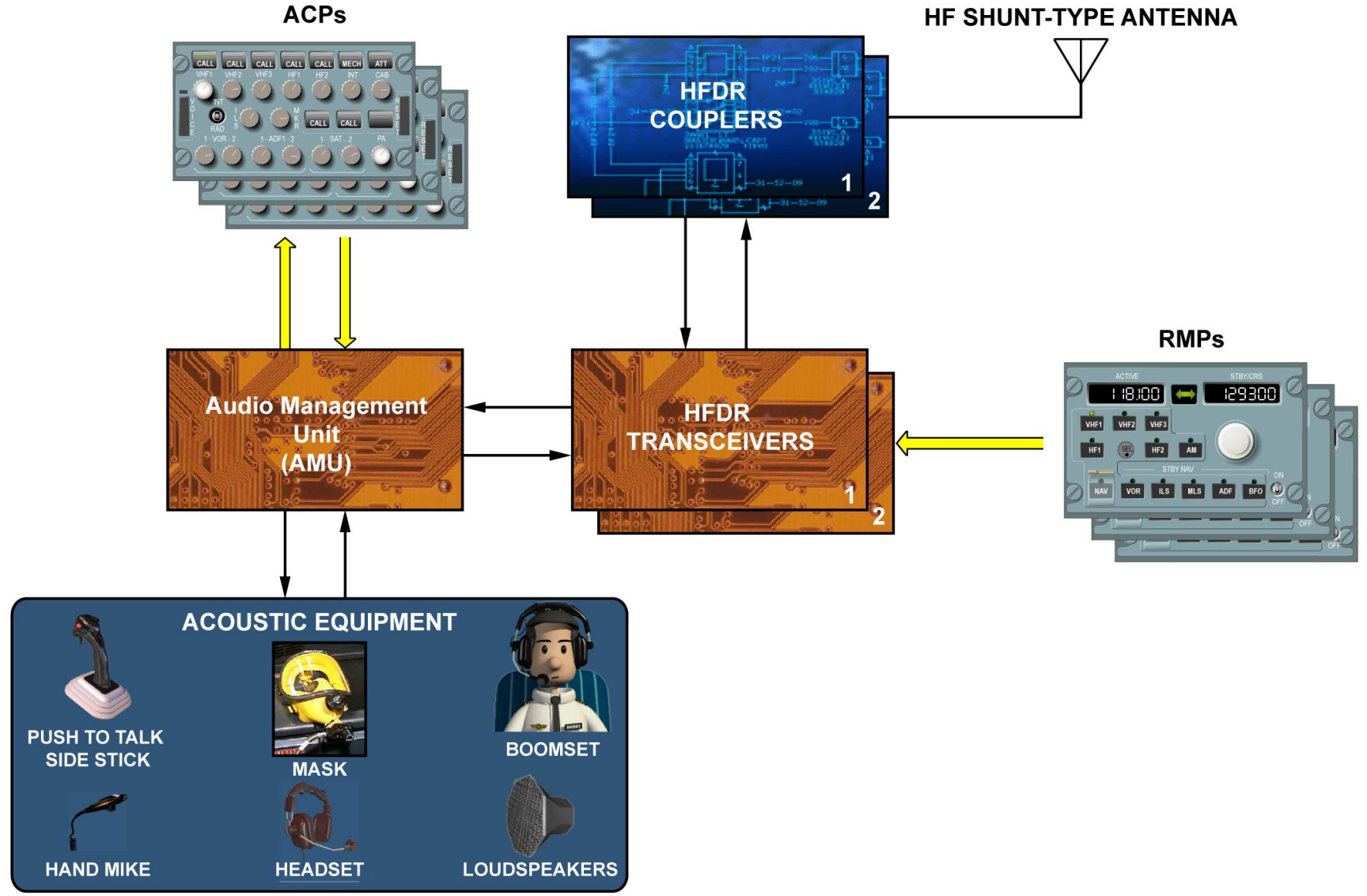

MAIN COMPONENTS OF THE HF SYSTEM

HF D/O (3)

SYSTEM ARCHITECTURE

In the HF system, the RMPs are used for HF1 and HF2 frequency control.
The HFDR transceivers have 2 serial input ports:
- serial input port A,
- serial input port B.

In normal conditions, both transceivers are tuned through port A from any RMP. The secondary port is dedicated to RMP2 when RMP1 and RMP3 have failed. RMP3 controls the radio communications transceivers through dialog buses, and RMP1 and RMP2. The port selection is performed through the PORT SELECTION information line.
The AMU acts as an interface between the users and the HF systems for transmission and reception of audio signals. The Push-to-Talk (PTT) key line is a ground signal sent to the transceiver through the AMU. The SELective CALling (SELCAL) system gives visual and aural indications to the flight crew, concerning calls received through the HF system.

NOTE: The SELCAL function is integrated in the AMU.

The ACPs are used for HF transmission or reception selection mode and control of the received audio signal levels through the AMU.
A BITE is integrated in the HF transceiver, for maintenance purposes. The BITE maintains 2-way communications with the Central the Maintenance Computer (CMC) through ARINC 429 buses. The BITE is used to detect and identify internal and external transceiver failures, to store maintenance data in a memory, to inform the external maintenance monitor, the CMC, and to execute tests.
Through the Landing Gear Control and Interface Unit (LGCIU) 1/2 a discrete ground signal is sent to the HF transceivers, when the A/C is in flight with L/G down or not. The LGCIU sends the flight/ground A/C status used by the HF BITE, in order to increment the fault memory, in case of failure of the CMC.

If the transmission lasts more than 1 minute, the "HF1 EMITTING" or "HF2 EMITTING" amber message is displayed on the EWD, through the System Data Acquisition Concentrator (SDAC) 1/2.
The HFDR 1 transceiver is connected to the Air Traffic Service Unit (ATSU) for direct exchange of data between the A/C and ground systems like A/C report or weather report.
The HFDR transceivers are also connected to the Data Loading Routing Box (DLRB), which is used to load the HFDR software.

NOTE: The DLRB / HFDR transceivers connection is optional on A330 and A340-300.

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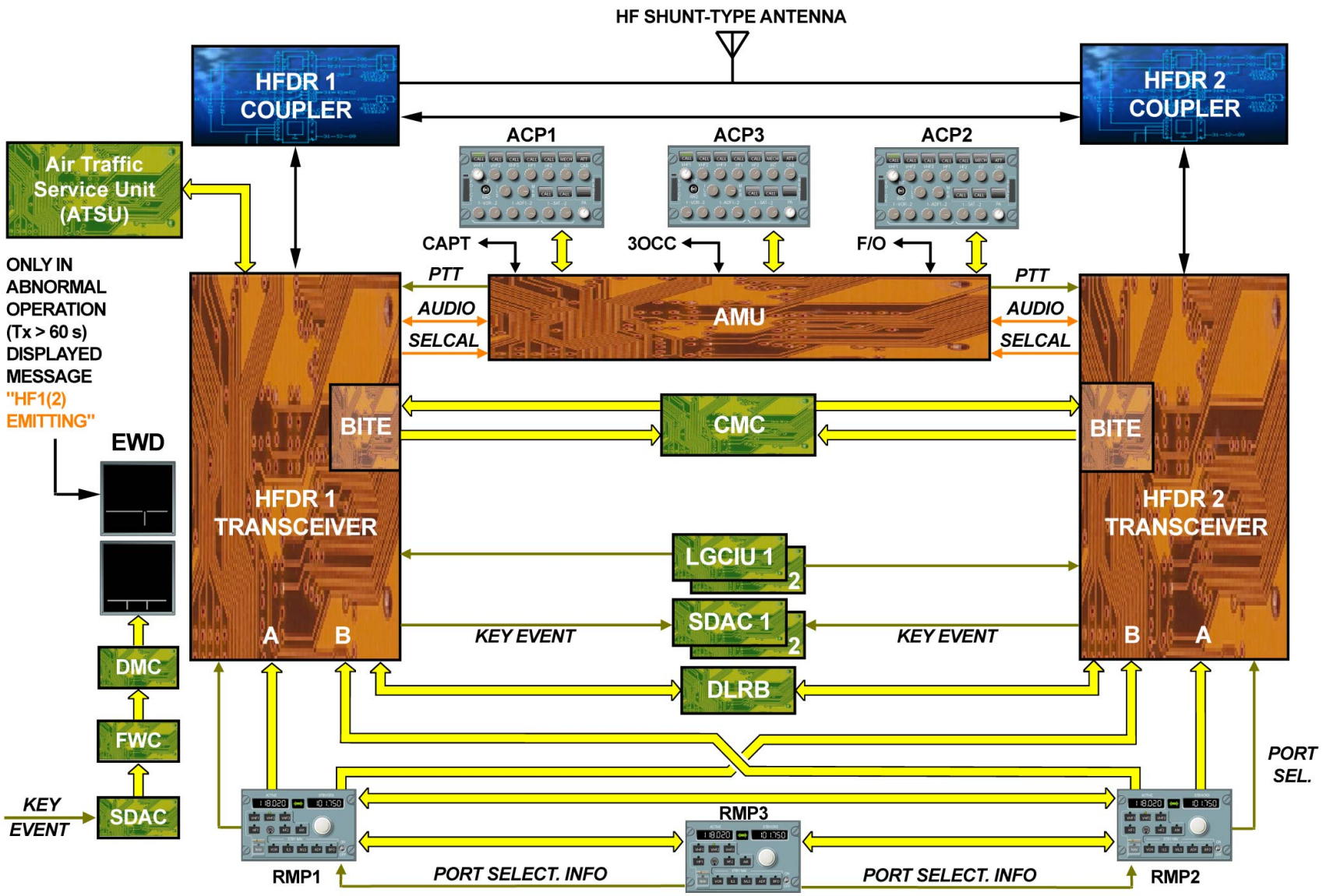

SYSTEM ARCHITECTURE

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HF D/O (3)

INTERFACE OF THE HFDR TRANSCEIVERS

The HFDR transceiver is linked to other systems through 3 types of lines:
- first, ARINC 429 buses with the RMPs, the CMC. The signal used is serial 32-bit word with a dedicated label. From RMPs to HFDR transceivers, two successive serial 32-bit tuning words with label 037, are dedicated only to HFDR transceivers. The first word contains:
- label 037,
- mode (SSB/AM/USB/LSB),
- 1 KHz, 10 KHz, 100 KHz,
- 1 MHz, 10 MHz,
- sign/status,
- parity.

The second word contains:
- label 037,
- continuous wave enable,
- 100 Hz,
- sign/status,
- parity.

For maintenance purposes, the HF BITE transmits failure messages with label 356 to the CMC. The label 377 (EQUIPMENT IDENTIFICATION) is also sent to the CMC. To compute the HF BITE, the CMC transmits flight/ground status information to the transceivers through label 227. An ARINC 429 High Speed (HS) bus is used between the HFDR 1 and the ATSU.
- second, discrete lines, from or to systems, the electrical level used by the KEY EVENT, the PTT key line, the flight/ground status or the PORT SELECTION information is a ground/open circuit. DISABLE 1/ DISABLE 2: for a dual HF system installation, pin X of coupler 1 must be connected to pin Y of coupler 2, to prevent any damage to the isolation amplifiers of both couplers. When in data mode, digital information is transmitted between HF1 and ATSU, HF transmission is inhibited on ground. A GND HF DATALINK P/BSW, located on the overhead panel, may override the inhibition. HF must not be used during refueling.
- third, analog lines are used for audio signals, side tone and the SELCAL information.

CHARACTERISTICS

The HF transceiver complies with the standard defined by ARINC 719:

TRANSMITTER:
- rf output power: SSB: 400 W pep, 125 W average,
- am: 125 W,
- tune: 72 to 85 W average,
- output impedance: 50 Ohms.

FREQUENCY RANGE:
- 2.0000 to 29.9999 MHz (wide),
- 2.8000 to 23.9999 MHz (narrow).

Out-of-range selection indicated by aural tone.

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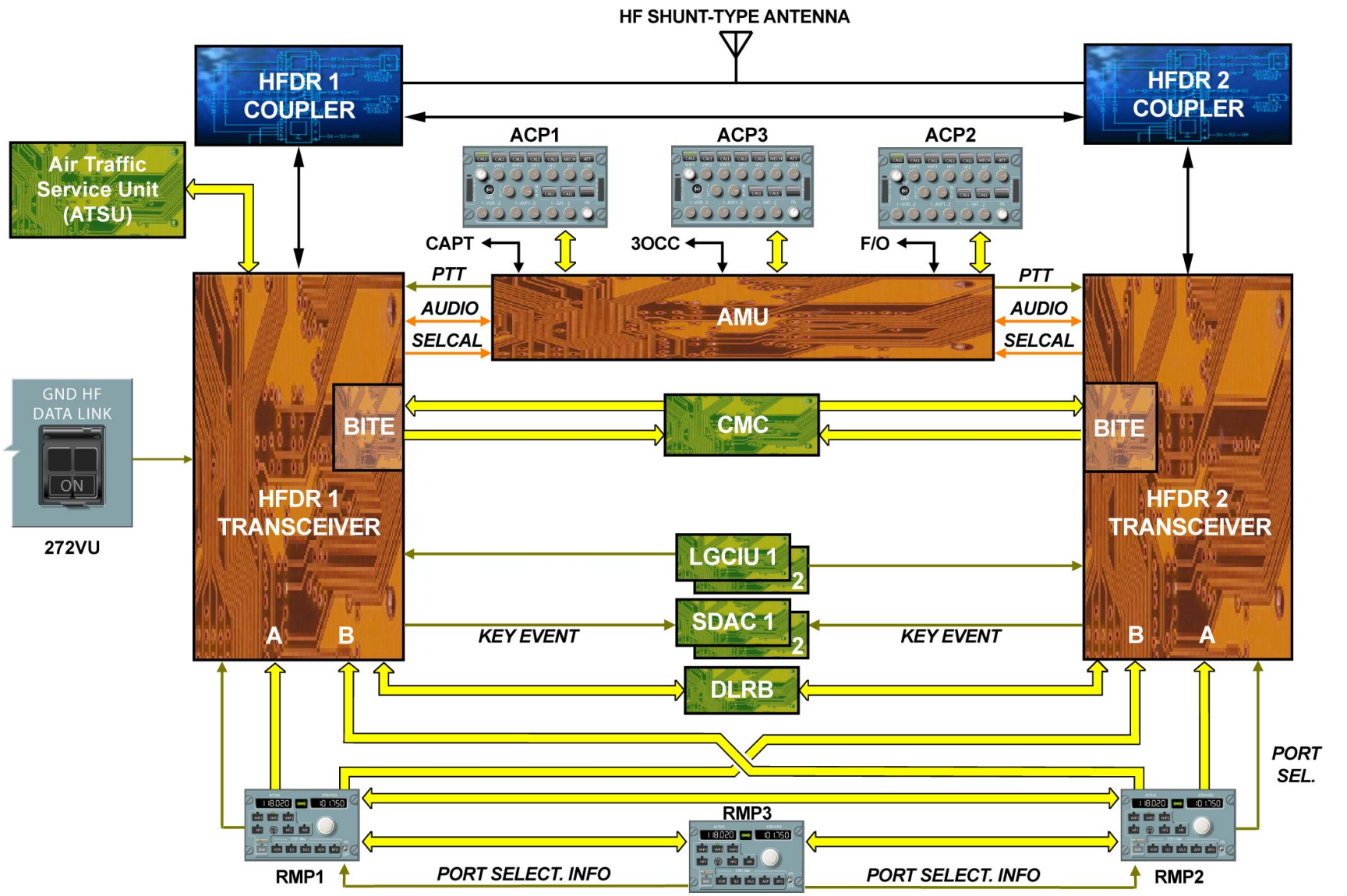

INTERFACE OF THE HFDR TRANSCEIVERS - CHARACTERISTICS

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VHF D/O (3)

GENERAL

The VHF system allows short distance voice communications between different A/C (in flight or on ground), or between the A/C and a ground station. The basic version is equipped with 3 VHF Data Radio (VDR) transceivers used for voice communications. The VHF system comprises:
- 3 VDR transceivers,
- 3 blade antennae.

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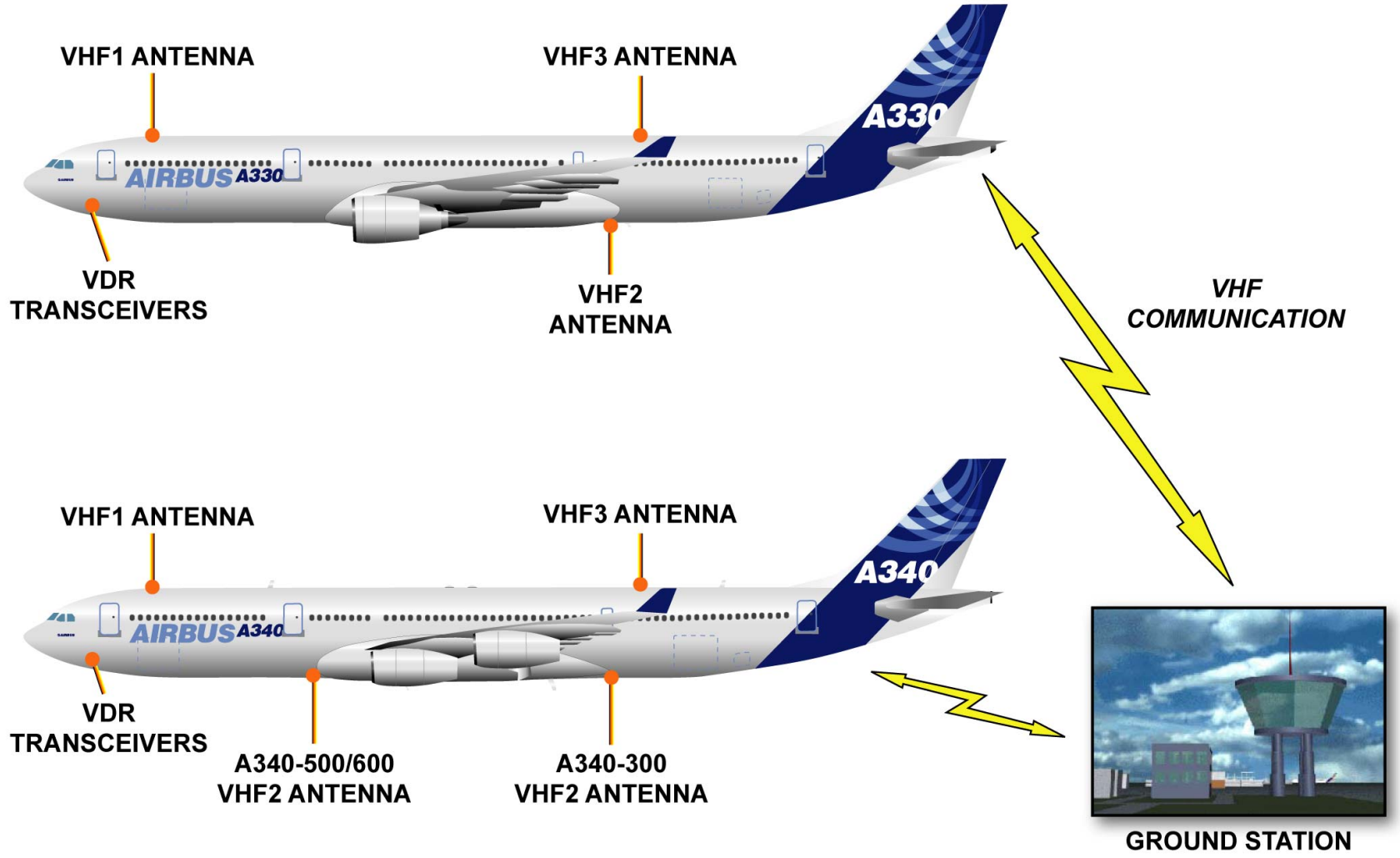
VHF1 ANTENNA
VHF3 ANTENNA
A330
AIRBUS A330
VDR
TRANSCEIVERS
VHF2
ANTENNA
VHF
COMMUNICATION
VHF1 ANTENNA
VHF3 ANTENNA
A340
AIRBUS A340
VDR
TRANSCEIVERS
A340-500/600
VHF2 ANTENNA
A340-300
VHF2 ANTENNA
GROUND STATION

GENERAL

VHF D/O (3)

MAIN COMPONENTS OF THE VHF SYSTEM

The main components of the VHF system are:
- the VDR 1/2/3 transceivers,
- the VHF antennae,
- the Radio Management Panels (RMPs),
- the Audio Management Unit (AMU),
- the Audio Control Panels (ACPs),
- the acoustic equipment, which is composed of 2 side-stick radio push to talk, 2 loudspeakers, 3 oxygen mask microphones, facilities for boomsets, headsets and microphones.

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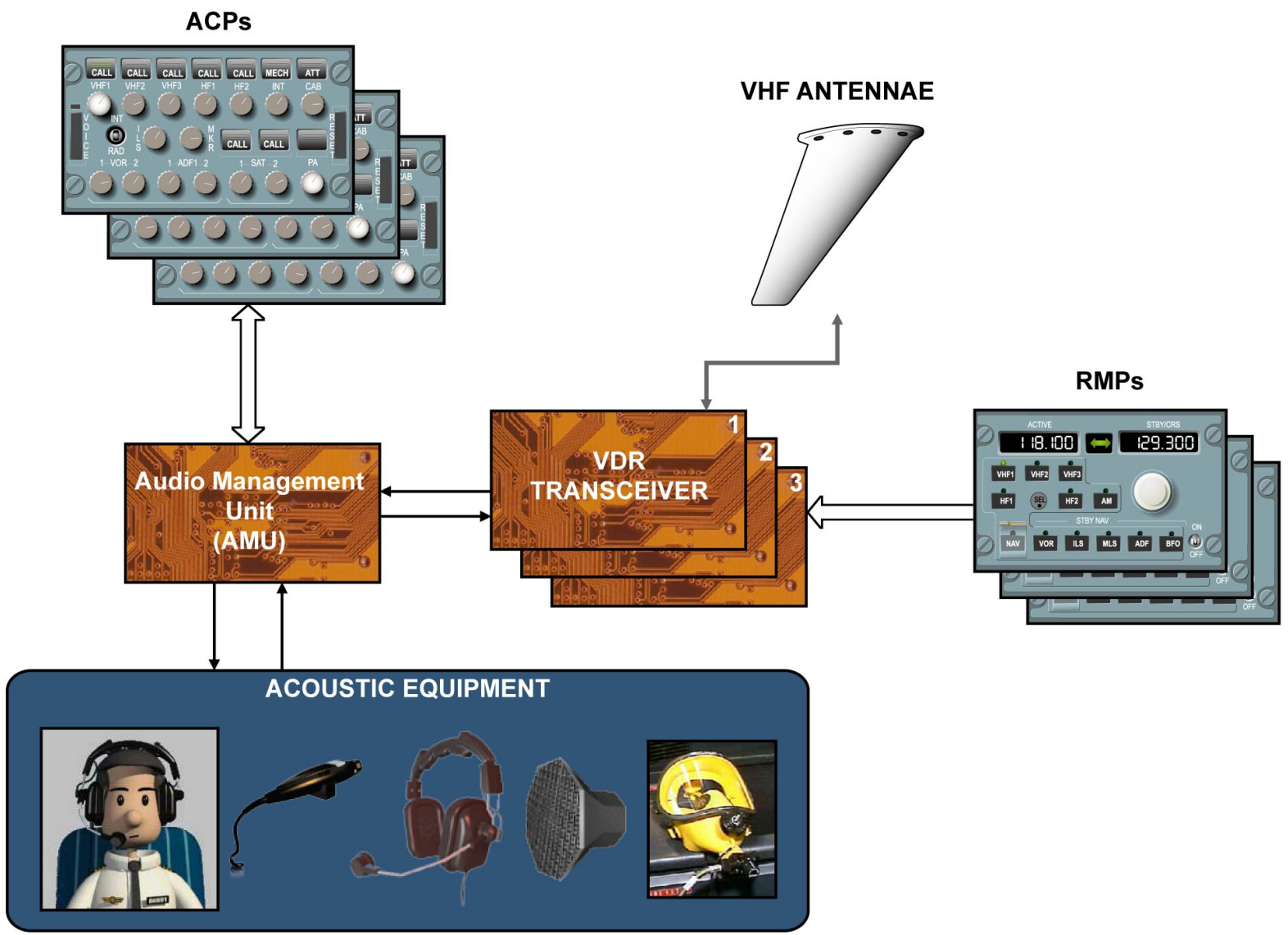

MAIN COMPONENTS OF THE VHF SYSTEM

VHF D/O (3)

SYSTEM ARCHITECTURE

In the VHF system, the RMPs are used for VDR1, 2 and 3 frequency control. The VDR transceivers have 2 serial input ports: serial input port A and serial input port B. In normal conditions, the three transceivers are tuned through port A from any RMP. The secondary port is dedicated to RMP2 when RMP1 and RMP3 have failed. RMP3 controls the radio communication transceivers through dialog buses and RMP1 and RMP2.The port selection is performed through the PORT SELECTION information line.
The AMU acts as an interface between the users and the VHF systems for transmission and reception of audio signals. The Push-to-talk (PTT) key line is a ground signal sent to the transceivers through the AMU.
The ACPs are used for VHF transmission or reception selection mode and control of the received audio signal levels through the AMU.
The VDR transceiver is a type 1 BITE system.
From the Landing Gear Control and Interface Units (LGCIUs) a discrete ground signal is sent to the VDR transceivers, when the A/C is in flight with L/G down or not. The LGCIU sends the FLIGHT/GROUND A/C status used by the VDR BITE, in order to increment the flight leg.
If the transmission lasts more than 1 minute, the "VHF1 EMITTING", "VHF2 EMITTING" or "VHF3 EMITTING" amber message is displayed on the EWD, through the System Data Acquisition Concentrators (SDACs).

NOTE: Note: when a transmission lasts more than 30 seconds, the transceiver emits an aural warning during 5 seconds.

The VDR 3 transceiver is also connected to the Air Traffic Service Unit (ATSU) for direct exchange of data between the A/C and ground systems like A/C report or weather report. In normal operation, the VDR 3 transceiver is tuned by the ATSU.

SELCAL

The SELective CALling (SELCAL) system gives visual and aural indications to the flight crew, concerning calls received through the VHF system.

NOTE: Note: the SELCAL function is integrated in the AMU.

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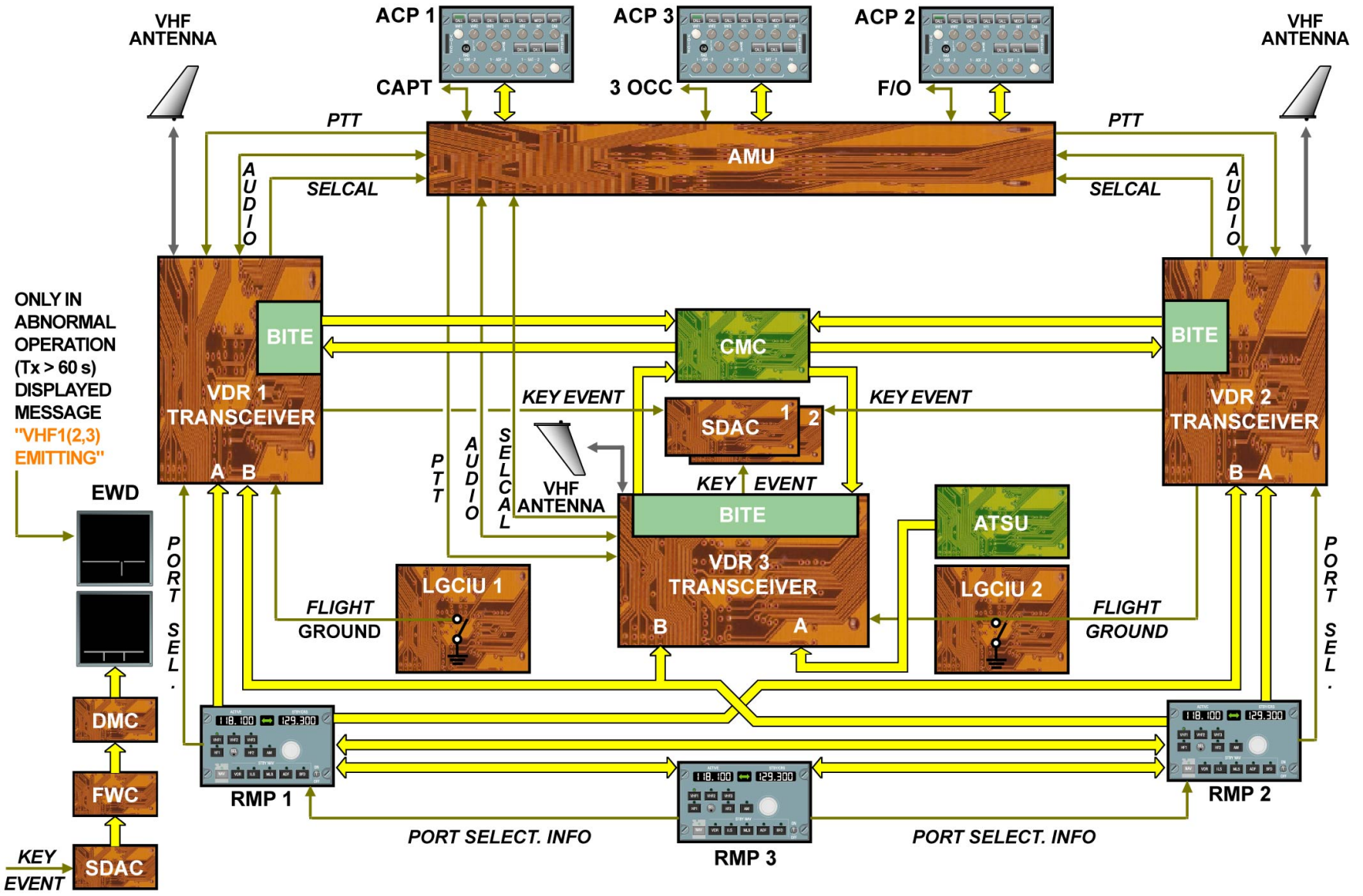

SYSTEM ARCHITECTURE - SELCAL

VHF D/O (3)

INTERFACE OF THE VDR TRANSCEIVERS

The VDR transceiver is linked to other systems through 3 types of lines:
- first, ARINC 429 buses with the RMPs (for tuning), and the Central Maintenance Computer (CMC) (for failure transmission or test).An ARINC 429 High Speed (HS) is used between VDR 3 and the ATSU.
- second, discrete lines, from or to systems, the electrical level used by the KEY EVENT, the PTT key line, the FLIGHT/ GROUND status or the PORT SELECTION information is a ground/open circuit.
- third, analog lines are used for audio signals, side tone and the SELCAL information.

DATA TRANSMISSION

Each VDR transceiver can operate in VOICE mode or DATA mode. In position 3 only, the VDR is active in DATA mode.
The ATSU sends data packages to the VDR 3 transceiver for modulation. The obtained VHF signal is then sent to the antenna for emission.
Upon receipt of VHF signals, the transceiver, when tuned on the selected frequency, transforms the signal into digital format, and transmits the data to the ATSU.
The ATSU automatically sets the VDR 3 transceiver into DATA mode by the VOICE/DATA selection discrete.
In abnormal operation, the switching between VOICE and DATA functions in the VDR 3 can be achieved by any RMP. In this case, the RMP sets the transceiver in VOICE mode via the VOICE/DATA selection information to the ATSU. Port B is then used for this operational mode.

CHARACTERISTICS

The VDR transceiver complies with ARINC 716 standards:
TRANSMITTER:
- RF output power: 25W (nominal),
- output impedance: 50 Ohms,
- power supply: 28 VDC,

FREQUENCY RANGE:
- 118.000Mhz to 137.975Mhz, with 8.33Khz spacing between channels.

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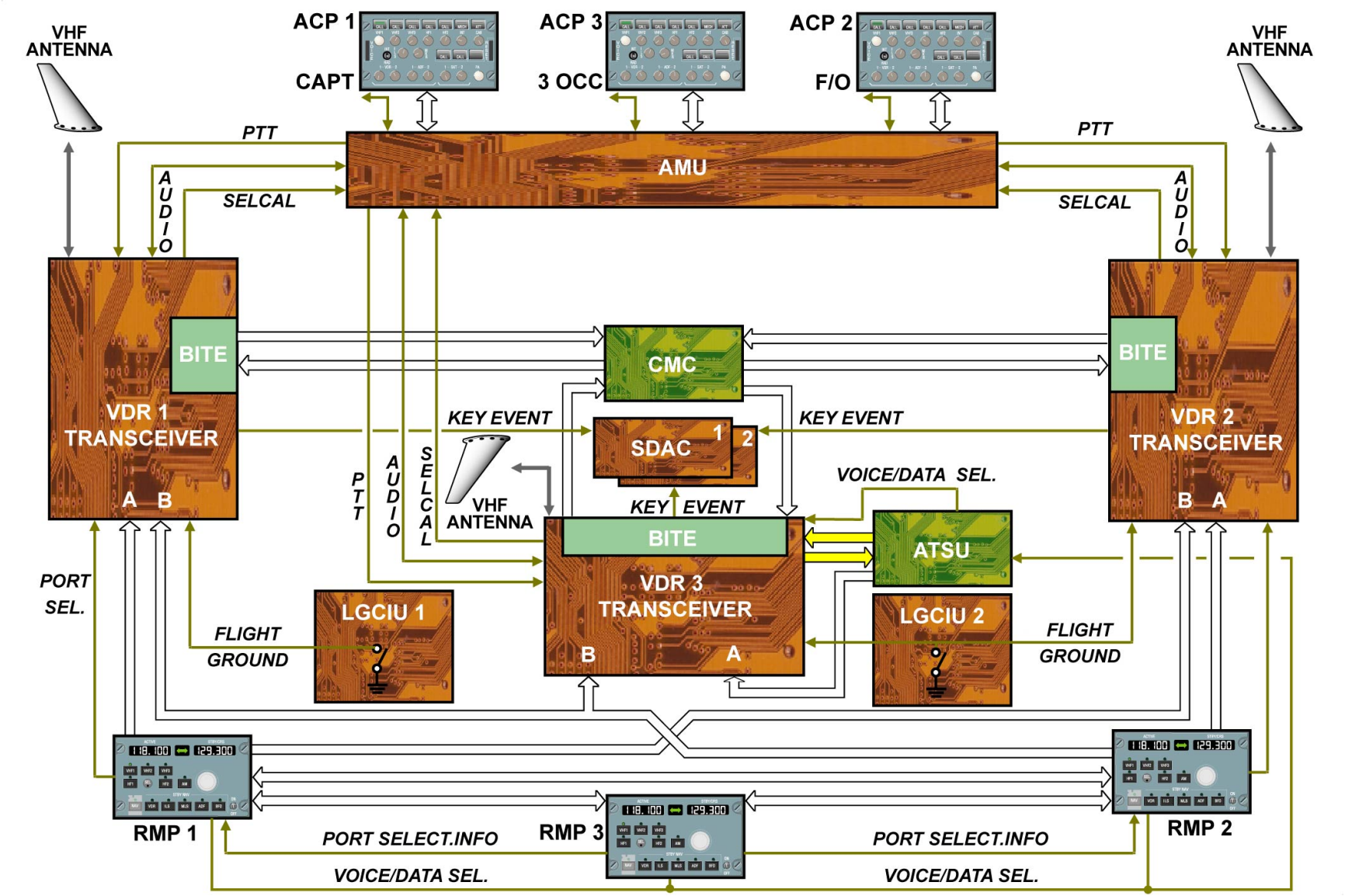

INTERFACE OF THE VDR TRANSCEIVERS - DATA TRANSMISSION & CHARACTERISTICS

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AUDIO MANAGEMENT D/O (3)

AUDIO MANAGEMENT UNIT ARCHITECTURE

The objective of this topic is to describe the Audio Management Unit (AMU) architecture.

GENERAL

The AMU comprises:
- audio cards,
- three cockpit amplifier cards,
- a SELCAL/BITE card,
- a flight interphone card,
- an emergency function.

The audio cards are:
- the CAPT audio card,
- the F/O audio card,
- the 3rd occupant audio card,
- the optional 4th and 5th occupant audio cards.

The cockpit amplifier cards are:
- the CAPT amplifier,
- the F/O amplifier,
- the Emergency cockpit amplifier.

AUDIO CARD FUNCTIONS

The audio cards provide the following functions:
- the transmission, reception and volume adjustment for radio, interphone and passenger announcements,
- processing,
- ARINC transmission and reception,
- power supply.

COCKPIT AMPLIFIER CARDS

The cockpit amplifier cards ensure the amplification, through loudspeakers, for the audio signals from and to the CAPT and F/O. They also amplify warning signals from the Flight Warning Computers (FWCs) and the Enhanced Ground Proximity Warning System (EGPWS). The muting function is done by the cockpit amplifiers.

SELCAL CALL/BITE CARD

The SELCAL CALL/BITE card provides the following functions:
- the decoding of selective calls,
- comparison between the received code and the code setting on the SELCAL control panel,
- identification of discrete attendant calls and mechanic calls,
- transmission of calls to the FWC and to Audio Control Panels (ACPs) via the corresponding audio cards,
- call cancellation and system re-initialization after a call, when a reset action is performed,
- the BITE circuit generates a message which gives the installation status of certain equipment.

The SELCAL CALL/BITE card also decodes the pin-programming in order to send the options/status information to the audio cards, the ACPs and the Central Maintenance System (CMS).

FLIGHT INTERPHONE CARD

The flight interphone card provides audio links between the various crew stations in the cockpit, between the cockpit and the ground crew (external power control panel) and between the cockpit and the avionics compartment (INPUT 6).

EMERGENCY SWITCHING

The emergency switching allows acoustic equipment to be switched, from CAPT or F/O, to the 3rd occupant audio card. The emergency switching also switches the audio and warning signals to the 3rd occupant cockpit amplifier card.

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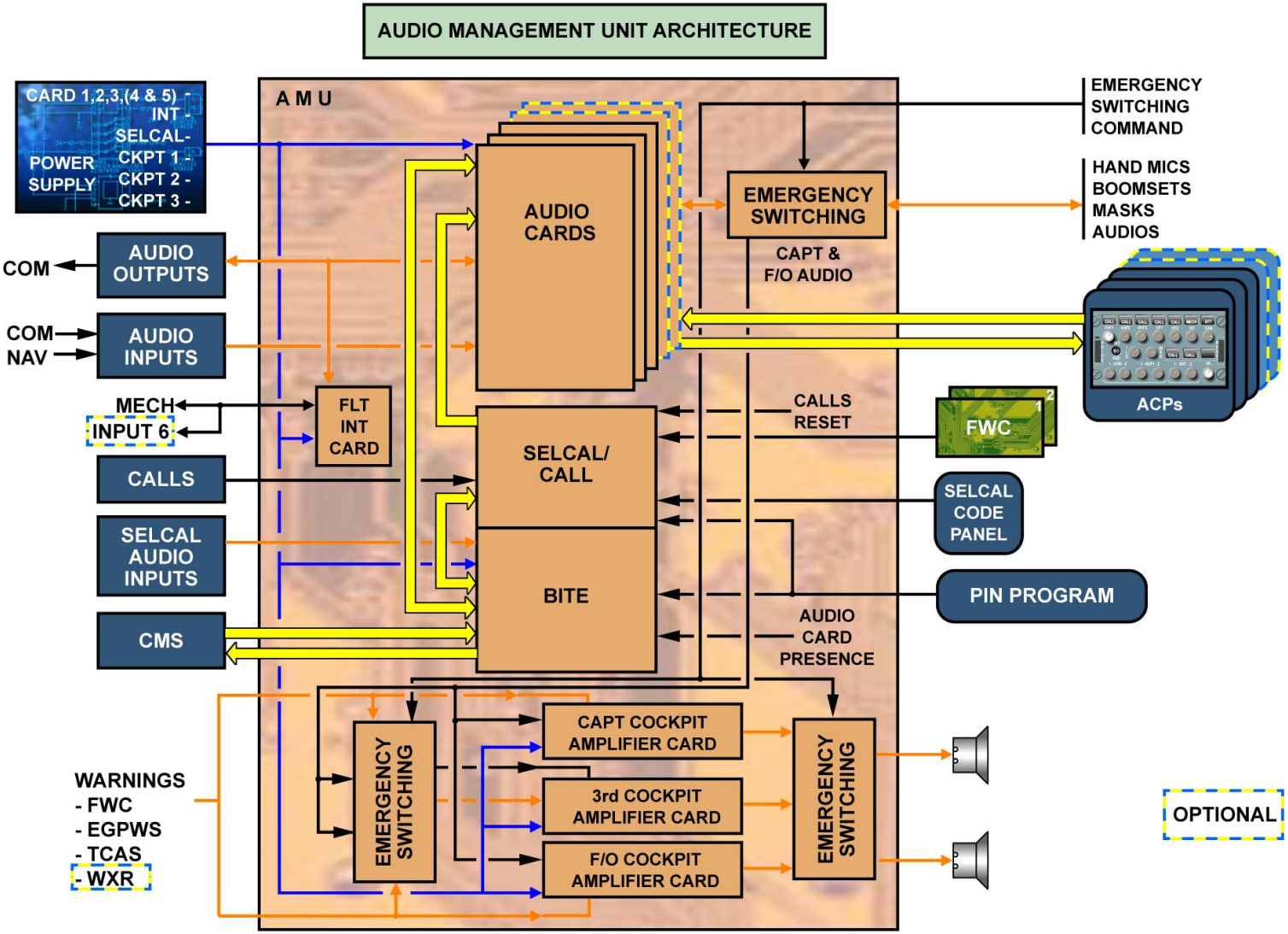

AUDIO MANAGEMENT UNIT ARCHITECTURE - GENERAL ... EMERGENCY SWITCHING

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AUDIO MANAGEMENT D/O (3)

AUDIO SWITCHING D/O

The objective of this topic is to describe in detail the emergency AUDIO SWITCHING in case of CAPT or F/O audio channel failure.

GENERAL

In case of emergency, there are two ways to recover a failure of the CAPT or F/O audio channel:
- the automatic emergency mode,
- the manual emergency mode.

An audio switching selector, located on the center pedestal, is used in manual mode. When manual audio switching is done, "AUDIO SWITCHING" is displayed on the ECAM right memo.

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AUDIO SWITCHING SELECTOR

In case of emergency, there are two emergency ways to recover a failure of the CAPT or F/O audio channel:
- the automatic emergency mode and,
- the manual emergency mode.

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AUDIO MANAGEMENT D/O (3)

AUDIO SWITCHING D/O (continued)

AUTOMATIC EMERGENCY MODE

In case of failure of the ACP or ACP-AMU connection, the audio channel concerned, in the AMU, automatically switches to the automatic emergency mode. This mode does not affect the warning indication function.

This mode consists in defining a preprogramming configuration for the reception level controls and radio transmission selection, until the manual emergency mode is selected. Preprogrammed level in reception:

- very High Frequency Data Radio 1 (VDR1): 5mW,
- high Frequency Data Radio 1 (HFDR1): 5mW,
- int: 5mW,
- pre-programmed transmission system selection: INTERPHONE (INT).

In case of failure of the DC Essential bus (401PP), an ECAM Message is triggered. The crew turns the switch (135 VU), to activate both relays and to supply Audio Card 1 or Audio Card 2 on the DC Normal Bus (101 PP).

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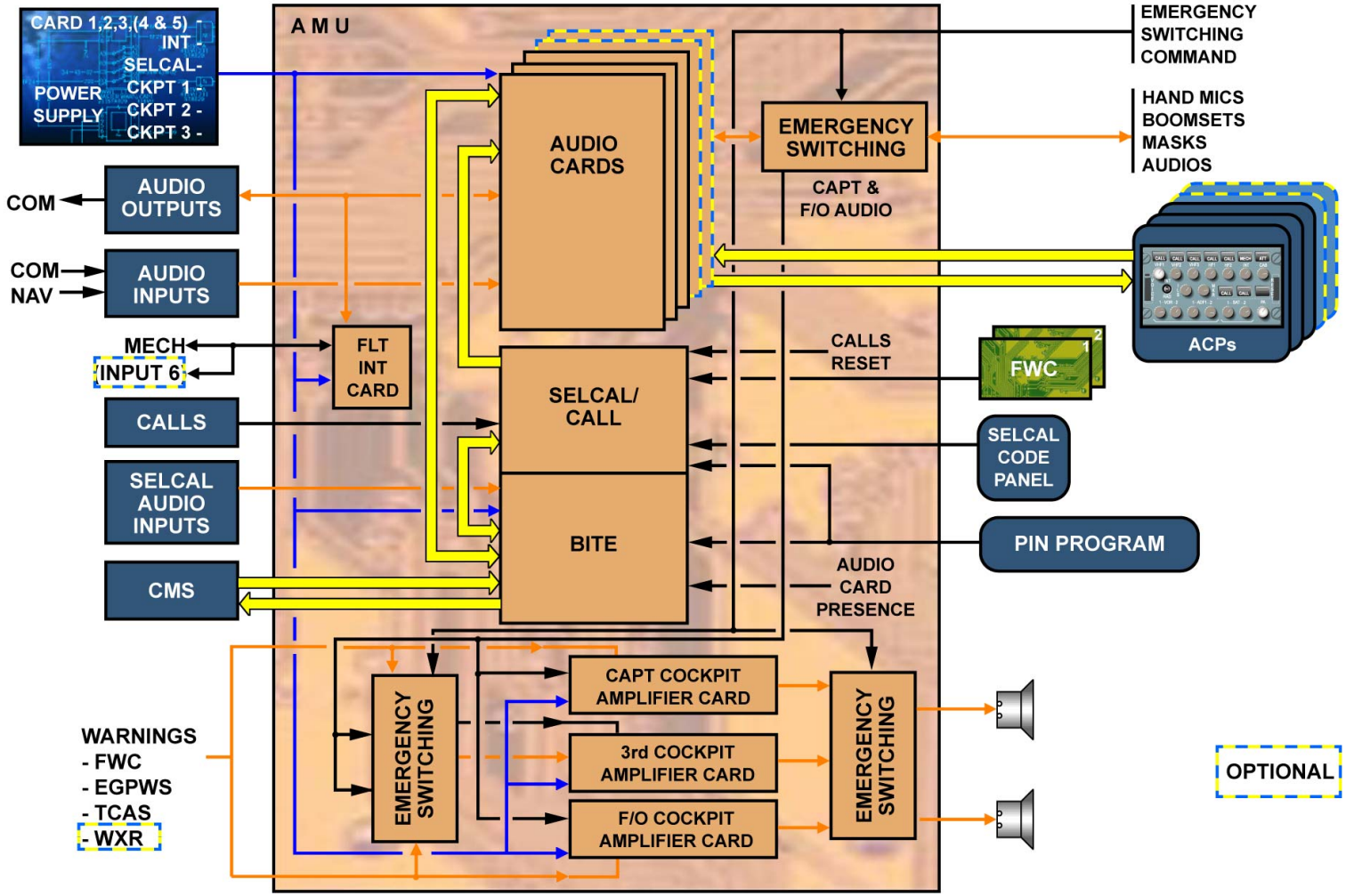

AUDIO SWITCHING D/O - AUTOMATIC EMERGENCY MODE

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AUDIO MANAGEMENT D/O (3)

AUDIO SWITCHING D/O (continued)

MANUAL EMERGENCY MODE 1 BOOMSET RECEPTION

In normal reception operation, each boomset is connected to its reception channel.

In reception, with a failure of the CAPT channel, setting the audio switching selector to the CAPT ON 3 position, switches the CAPT channel to the third occupant channel. The CAPT channel is in parallel with the 3rd occupant channel.

In reception, with a failure of the F/O channel, setting the audio switching selector to the F/O ON 3 position, switches the F/O channel to the third occupant channel. The F/O channel is in parallel with the 3rd occupant channel.

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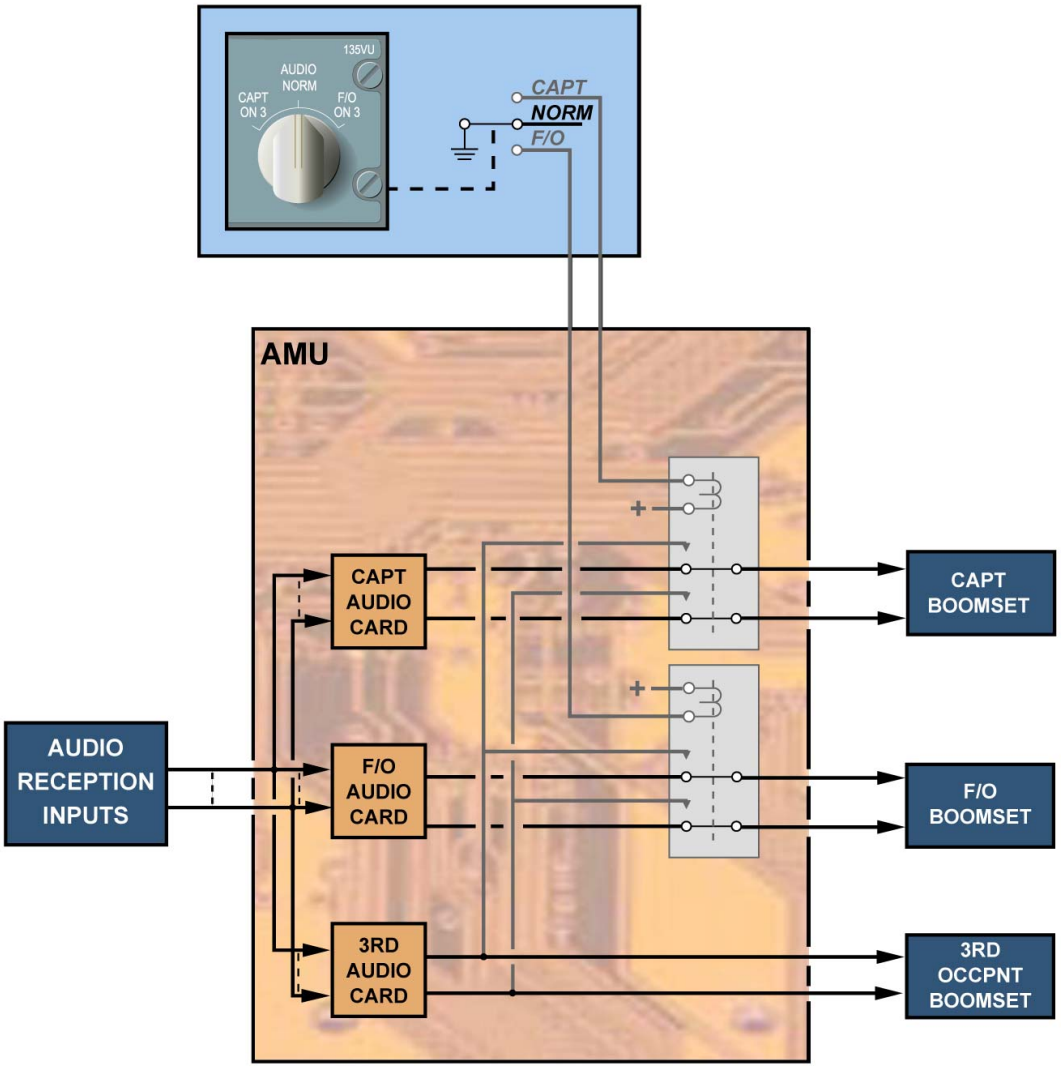

AUDIO SWITCHING D/O - MANUAL EMERGENCY MODE 1 BOOMSET RECEPTION

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AUDIO MANAGEMENT D/O (3)

AUDIO SWITCHING D/O (continued)

MANUAL EMERGENCY MODE 2 TRANSMISSION

In normal transmission operation, each channel is connected to its microphone amplifier.

In transmission mode with a failure of the CAPT channel, setting the audio switching selector to the CAPT ON 3 position, switches the CAPT microphone to the third occupant microphone amplifier. The microphone of the 3rd occupant is disconnected from the 3rd occupant microphone amplifier. The CAPT microphone is connected to the 3rd occupant microphone amplifier.

In transmission mode, with a failure of the F/O channel, setting the audio switching selector to the F/O ON 3 position, switches the F/O microphone to the 3rd occupant microphone amplifier. The microphone of the 3rd occupant is disconnected from the 3rd occupant microphone amplifier. The F/O microphone is connected to the 3rd occupant microphone amplifier.

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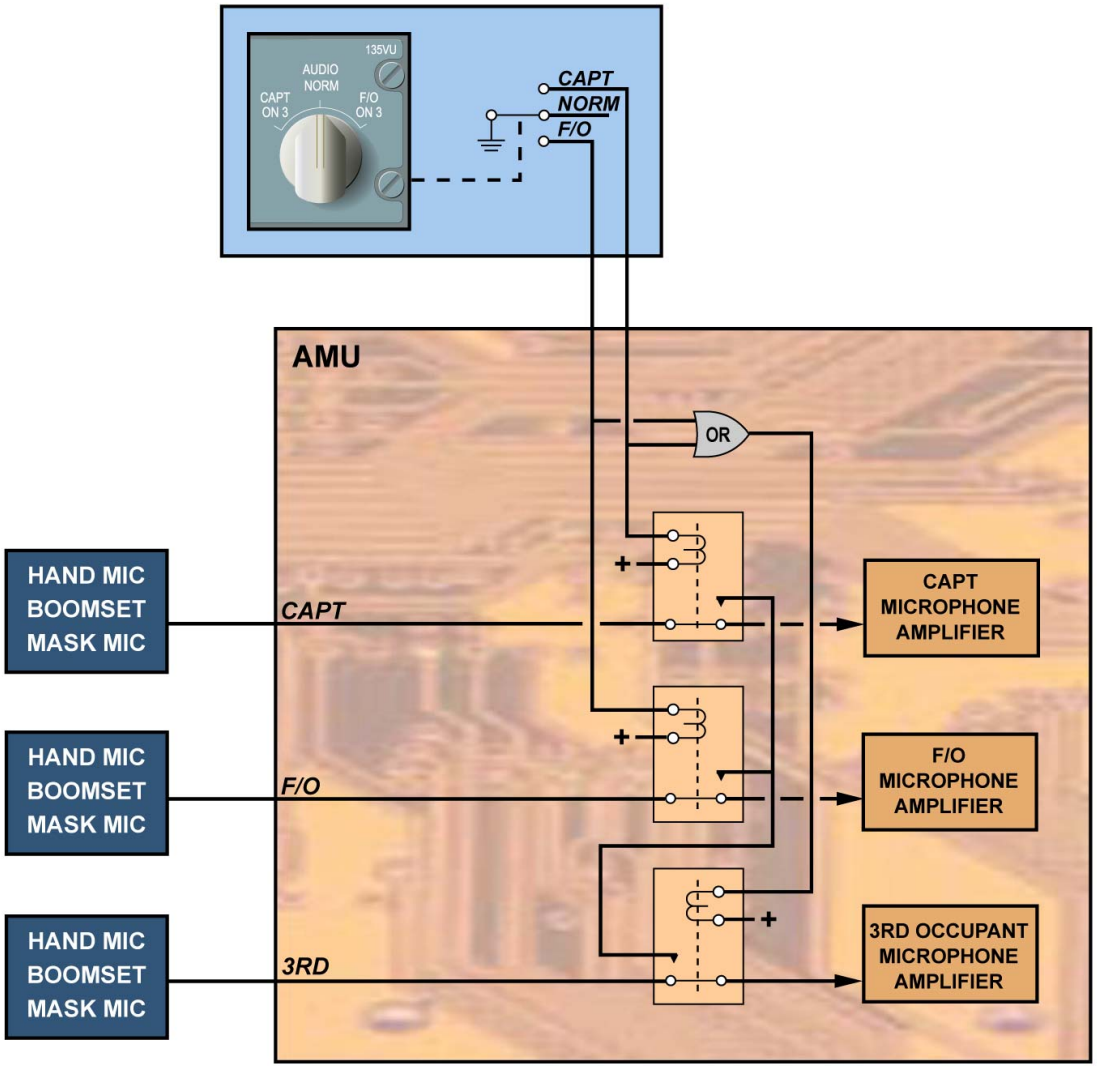

AUDIO SWITCHING D/O - MANUAL EMERGENCY MODE 2 TRANSMISSION

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AUDIO MANAGEMENT D/O (3)

AUDIO SWITCHING D/O (continued)

MANUAL EMERGENCY MODE 3 LOUDSPEAKERS

In normal operation, the CAPT audio card is connected to the left cockpit loudspeaker, through the CAPT cockpit amplifier. The F/O audio card is connected to the right cockpit loudspeaker, through the F/O cockpit amplifier. WARNING 1 is connected to CAPT cockpit amplifier. WARNING 2 is connected to F/O cockpit amplifier.
In case of a failure of the CAPT channel, setting the audio switching selector to the CAPT ON 3 position, switches the left cockpit loudspeaker to the emergency cockpit amplifier. WARNING 1 is connected to emergency cockpit amplifier. WARNING 2 is connected to F/O cockpit amplifier.
In case of a failure of the F/O channel, setting the AUDIO SWITCHING selector to the F/O ON 3 position, switches the right cockpit loudspeaker to the emergency cockpit amplifier. WARNING 1 is connected to CAPT cockpit amplifier. WARNING 2 is connected to emergency cockpit amplifier.

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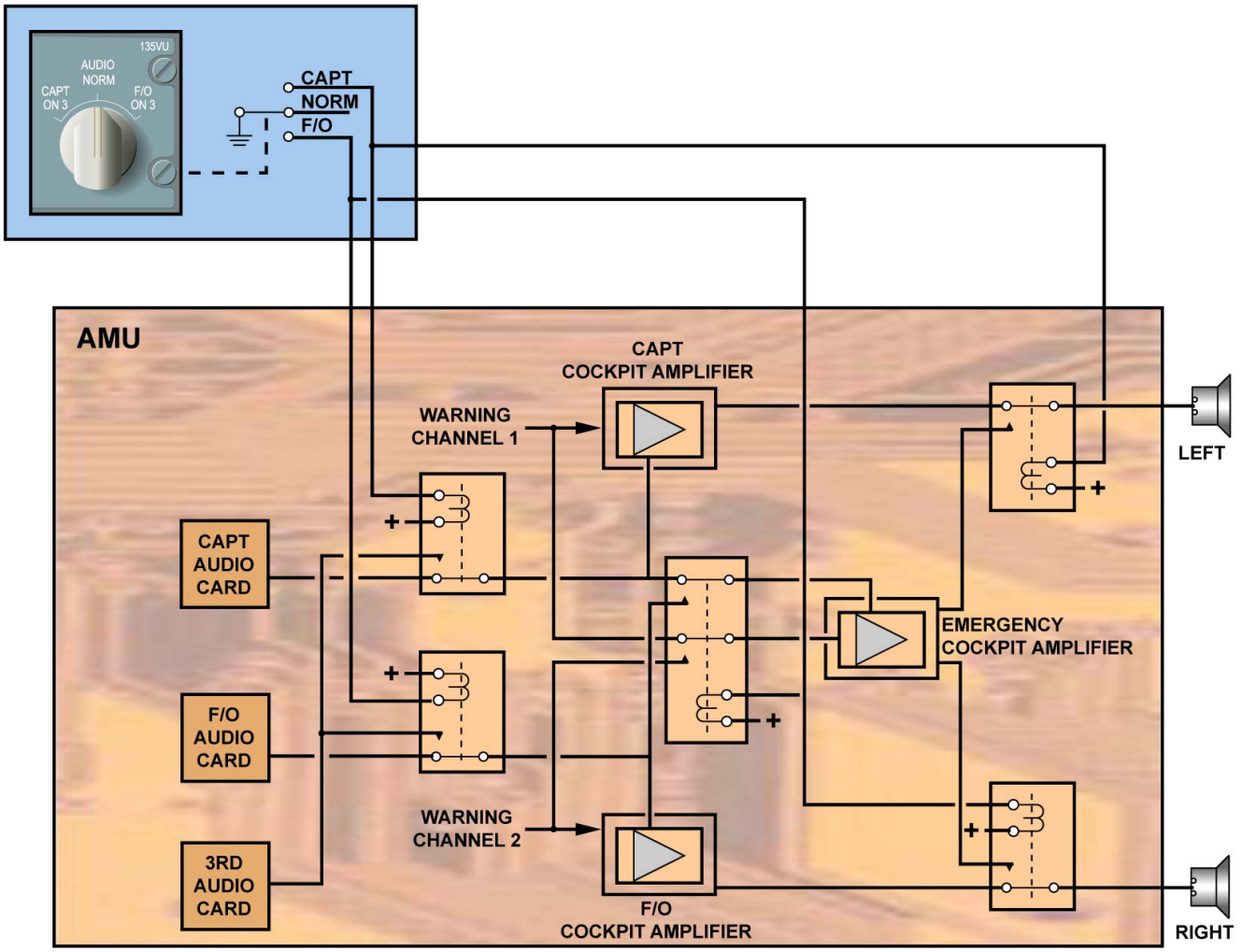

AUDIO SWITCHING D/O - MANUAL EMERGENCY MODE 3 LOUDSPEAKERS

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AUDIO MANAGEMENT D/O (3)

SELCAL/CALL D/O

The objective of this topic is to describe in detail the SELCAL and CALL functions.

GENERAL

The SELCAL and CALL functions are performed in the AMU by the SELCAL/CALL card. This card receives SELCAL calls from the ground stations via the communication channels, a SELCAL code from the SELCAL code panel, CALLs from the ground crew and the attendant stations and provides visual and aural warnings. The SELCAL card also sends information about the pin programming options to the audio cards and the ACPs.

OPERATION

The SELCAL/CALL card has 7 inputs. These inputs are permanently scanned, and when a SELCAL signal is present, a comparison is made with the code programmed on the SELCAL code panel.
When the 2 codes agree, a message is sent to the various ACPs, via the related audio cards. On the ACPs, the CALL light, related to the communication channel used, flashes amber.
At the same time, data is sent to the FWCs.
The FWCs send an audio call buzzer to the loudspeakers, through the cockpit amplifier in the AMU.
The CALL is cancelled using the RESET key on one ACP, or by selecting the called channel and activating the Push To Talk (PTT).

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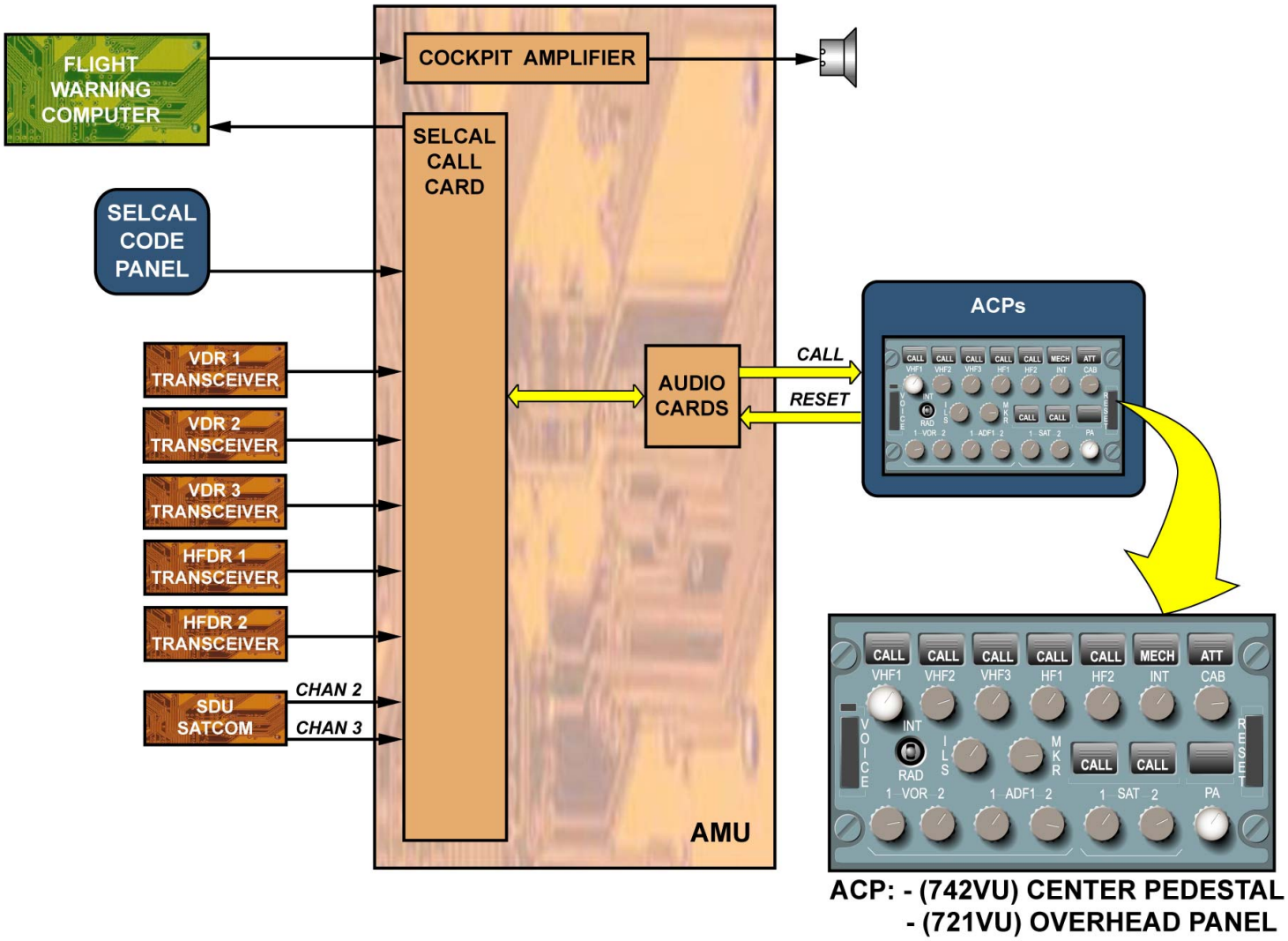

SELCAL/CALL D/O - GENERAL & OPERATION

AUDIO MANAGEMENT D/O (3)

SELCAL/CALL D/O (continued)

GROUND CALL

Two types of call may be received by the SELCAL CALL card:
- a ground call,
- a cabin attendant call.

When the COCKPIT CALL P/B, located on the EXTernal PoWeR control panel, is pressed a discrete signal is sent to the SELCAL CALL card and to the FWC. The FWC activates the buzzer signal and sends it to the cockpit amplifiers in the AMU to be broadcast through the loudspeakers.

The SELCAL card sends a signal through the various audio cards to the ACPs. The MECH legend flashes amber for 60 seconds on the ACPs. The visual call is automatically cancelled and the circuit is reinitialized after 60 seconds (According to company policy) or when the RESET P/B is pressed on any ACP. The automatic reset may be cancelled with the AMU pin programming.

ATTENDANT CALL

When a call is made from a cabin attendant station, the Cabin Intercommunication Data System (CIDS) sends a discrete signal to the SELCAL/CALL card and to the FWC.

The FWC activates the buzzer signal and sends it to the cockpit amplifier in the AMU to be broadcast through the loudspeakers.

The SELCAL CALL card sends a signal through the various audio cards to the ACPs. The ATT legend flashes for 60 seconds on the ACPs. The visual call is automatically cancelled and the circuit reinitialized after 60 seconds or when the RESET P/B is pressed, on any ACP. Information is also sent to the CIDS for reinitialization.

The automatic reset may be cancelled with the AMU pin programming.

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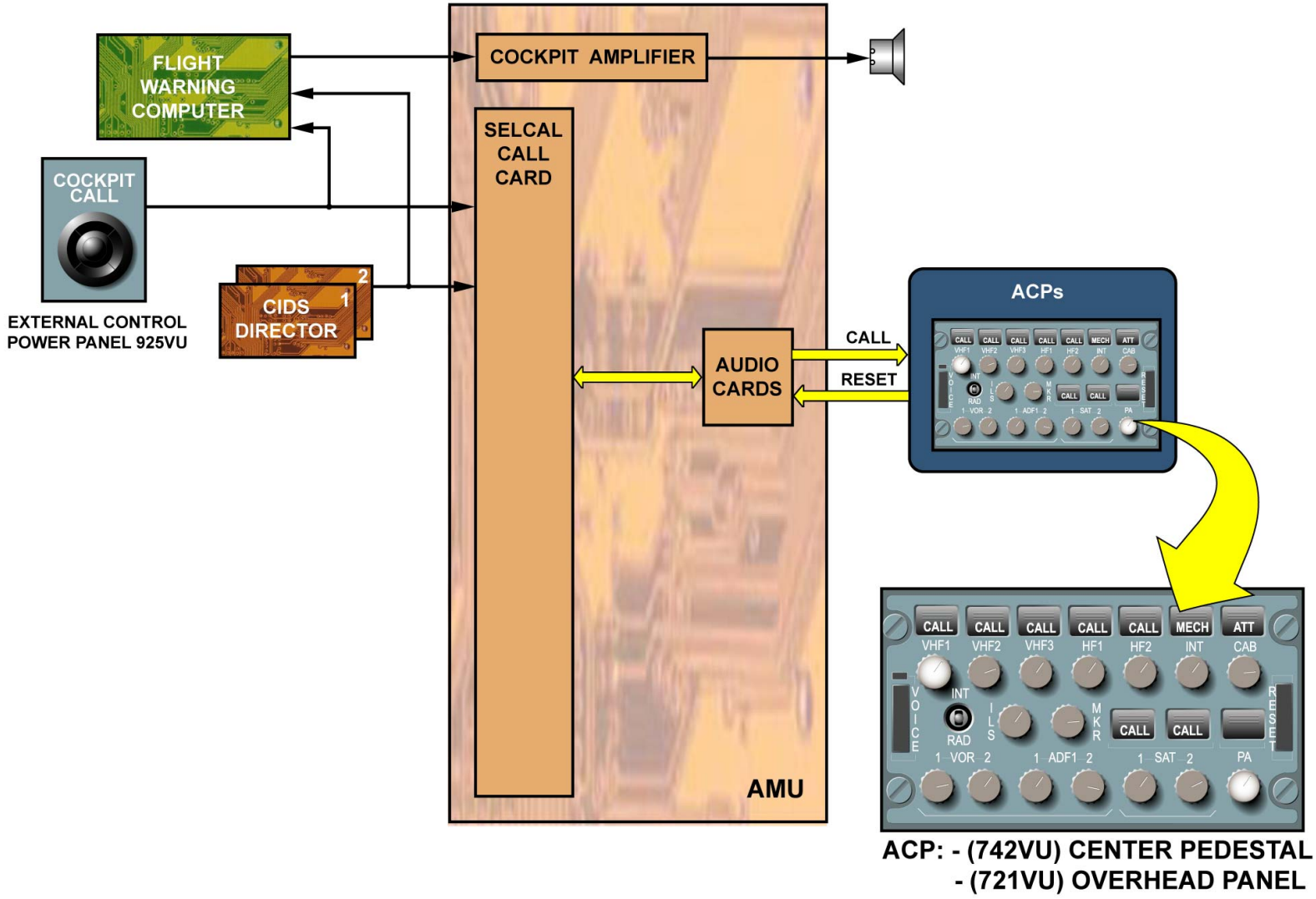

SELCAL/CALL D/O - GROUND CALL & ATTENDANT CALL

SATELLITE COMMUNICATION D/O (3)

GENERAL

The SATCOM system provides satellite communication for cockpit and cabin. It supports DATA and VOICE communications.
The SATCOM system is composed of two subsystems: the avionics subsystem and the antenna subsystem.

AVIONICS SUBSYSTEM

The main components of the SATCOM avionics subsystem are:
- the Satellite Data Unit (SDU),
- the High Speed Data Unit (HSDU)
- the Radio Frequency Unit (RFU),
- the High Power Amplifier (HPA).

The SDU and RFU provide all essential services required to accommodate effective air/ground communications, via satellite, using the antenna and related RF components.
The SDU manages the RF link protocols on the satellite side and provides the appropriate interface with the avionics subsystem for communication management.
The HPA boosts the signal to be transmitted to the satellite.

ANTENNA SUBSYSTEM

The main components of the SATCOM antenna subsystem are:
- the Diplexer/Low Noise Amplifier (D/LNA),
- the Beam Steering Unit (BSU),
- the High Gain Antenna (HGA).

The D/LNA provides segregation between transmitted and received signals and amplification of the received signal.
The BSU controls the pointing of the antenna.
The HGA transmits and receives L-band RF signals to and from the satellite the BSU is pointed at.

INTERFACES

The SATCOM avionics subsystem is mainly connected to:
- the Air Data/Inertial Reference System (ADIRS) for antenna control steering and Doppler correction,
- the Air Traffic and Information Management System (ATIMS) for cockpit data transmission,
- the audio management system for cockpit voice communication,
- the Passenger Air-to-ground Telephone System (PATS) for cabin fax/telephone capabilities.

The 115 VAC bus 2 electrically supplies all SATCOM elements. The SDU and RFU are on the same circuit breaker: 1RV.The HPA, D/LNA and BSU are on the same circuit breaker: 3RV.The BSU supplies the HGA.

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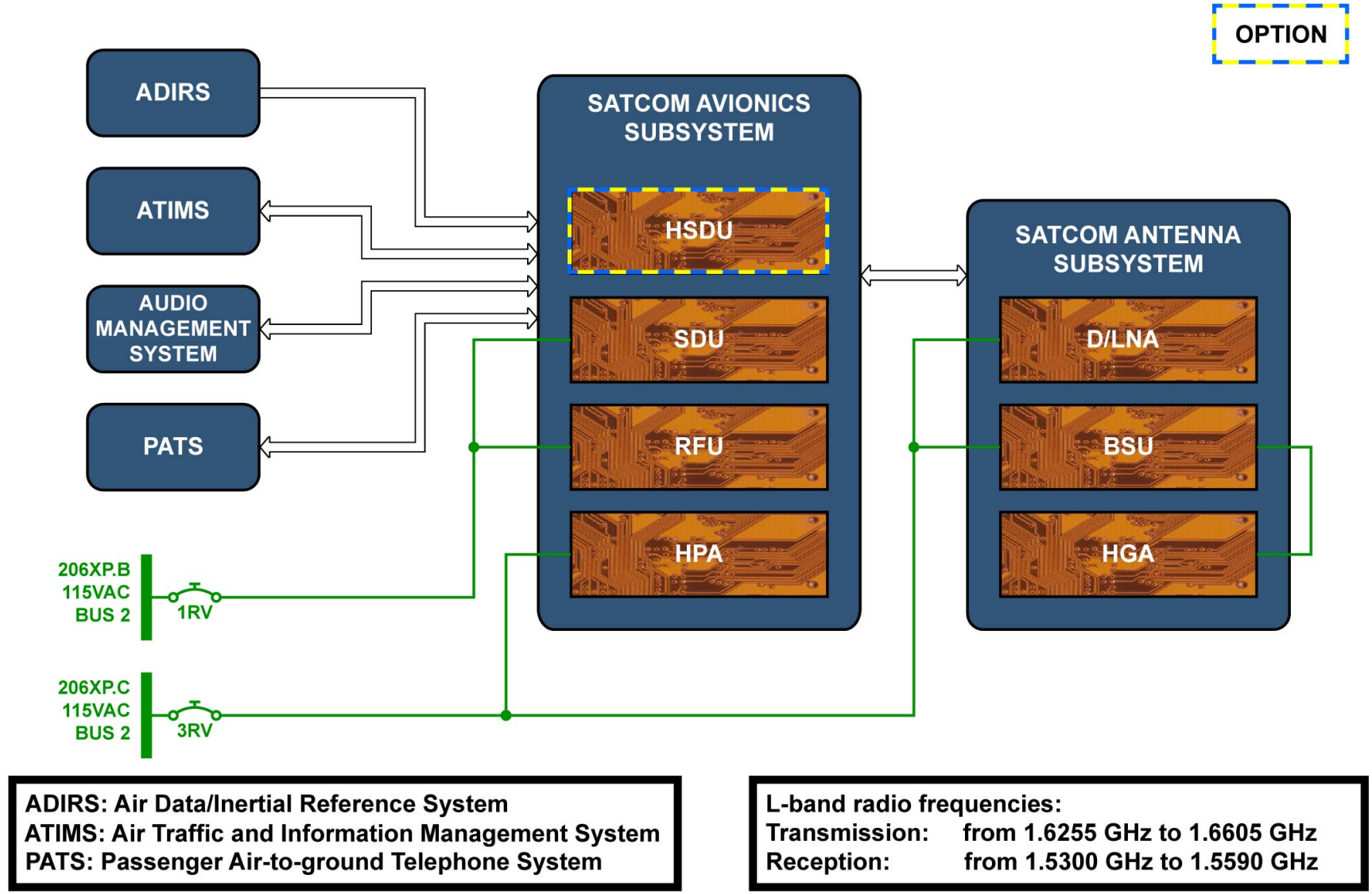

GENERAL - AVIONICS SUBSYSTEM ... INTERFACES

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SATELLITE COMMUNICATION D/O (3)

DESCRIPTION

The SDU is the main processing element of the SATCOM avionics. It controls and monitors the aircraft satellite communication:
- controlling timing functions,
- performing voice and data digitizing,
- performing coding/decoding functions,
- defining system protocols,
- providing other system interfacing.

SATELLITE DATA UNIT (SDU)

The SDU is connected to:
- the Audio Management Unit (AMU) for cockpit voice communication,
- the Air Traffic and Service Unit (ATSU) for system and maintenance data reports,
- the Cabin Telecommunication Unit (CTU) for cabin voice/data telecommunication with the ground,
- the MCDUs for control and monitoring of the SATCOM system,
- the Air Data/Inertial Reference Units (ADIRUs) to provide relative azimuth and relative elevation for optimum reception and transmission,
- the Multipurpose Disk Drive Unit (MDDU) through the Data Loading Routing Box (DLRB) for data loading of the Owner Requirement Table (ORT),
- the Central Maintenance Computer (CMC) for BITE information and system tests.

The SDU contains a maximum of 6 channels,1 for ATSU, 2 for cockpit voice and 3 for cabin voice/data communications, capable of providing simultaneous full duplex operation.

HIGH SPEED DATA UNIT (HSDU)(OPTION)

Optionally, the HSDU splits/combines internally its RF reception/transmission with the SDU RF reception/transmission. It transmits and receives data for cabin internet based application (mail, web browsing,...).
The High speed SATCOM uses the HPA resources to transmit data to the satellite. The Swift64 services may differ according to the cabin.
The HSDU channels available and the services in use can be check on the MCDU. This information is available on the "HSD CHANNEL STATUS" page adjacent to the line key 5L.

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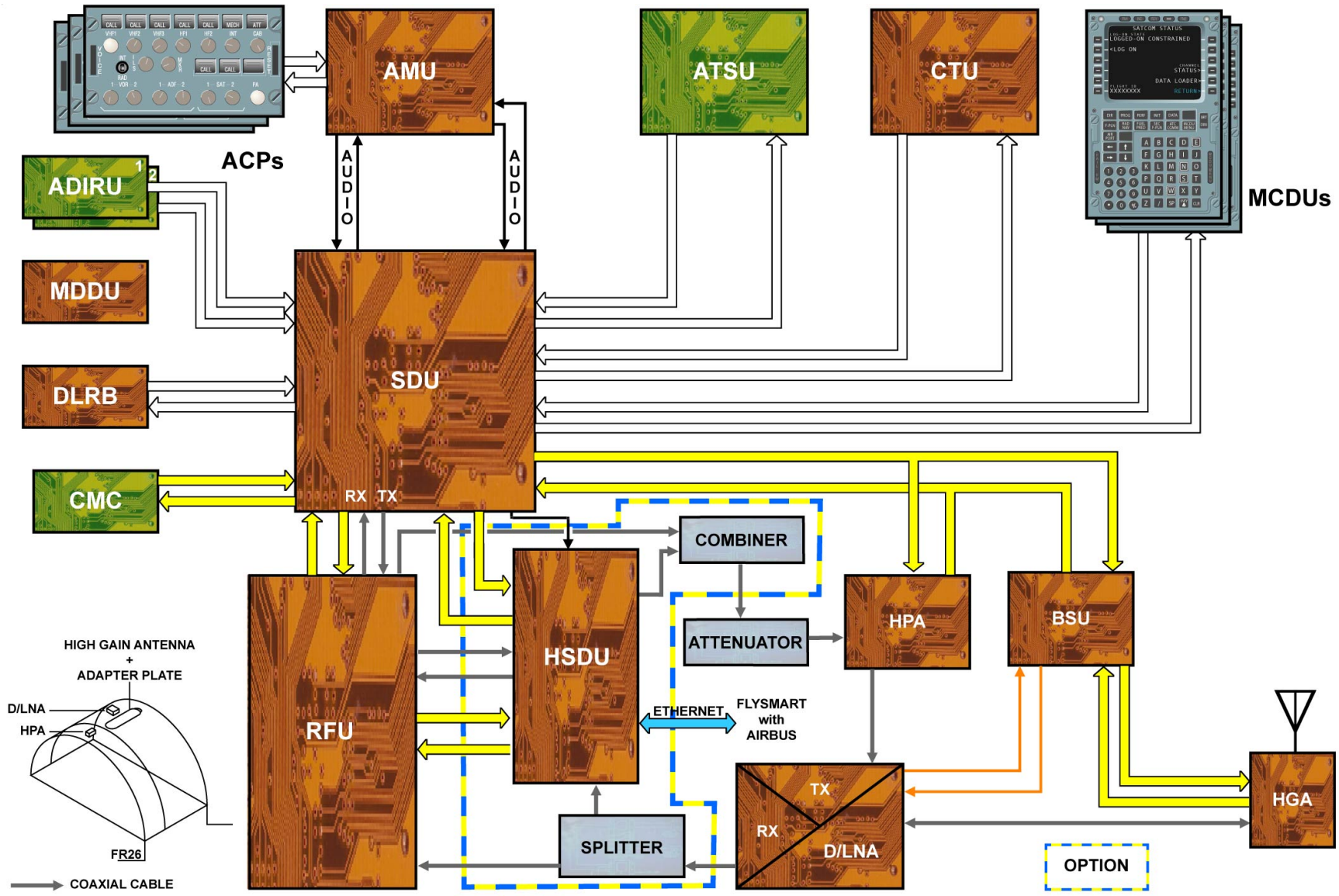

DESCRIPTION - SATELLITE DATA UNIT (SDU) & HIGH SPEED DATA UNIT (HSDU)(OPTION)

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SATELLITE COMMUNICATION D/O (3)

DESCRIPTION (continued)

RADIO FREQUENCY UNIT (RFU)

The RFU converts intermediate frequency (IF) signals from SDU to L-band radio frequency signal for transmission to the satellite and vice-versa.
The transmission (Tx) signal is sent to the HPA through a variable attenuator, manually adjustable. The attenuator ensure a high quality signal transmission between RFU and HPA, following the quality of the signal, the HPA will determinate the transmission mode, data or voice. The reception (Rx) signal is received from the D/LNA.
Fault status information of the RFU is connected to the CMC via the SDU.

HIGH POWER AMPLIFIER (HPA)

The HPA is only used for signal transmission.
The high power amplifier amplifies the RFU-generated L-band signal to the appropriate power level required to maintain the air-to-ground communication link. The power level is permanently adjusted in order to minimize the satellite power consumption. The linear HPA provides the required 80 watts maximum power output.
To perform the power adjustment, the HPA receives beam information from the SDU.
Fault status information of the HPA is connected to CMC via the SDU.

DIPLEXER/LOW NOISE AMPLIFIER (D/LNA)

The Diplexer part segregates the Tx and Rx signals to allow duplex communications. It provides electrical isolation of the transmitted and received signals between the HPA and LNA.
In the chain of signal amplification, the LNA part provides the first stage of amplification and filtering of the Rx signal. After this process, the Rx signal is sent to the RFU.
The BITE of the D/LNA is performed by the BSU and SDU.

BEAM STEERING UNIT (BSU)

The BSU controls the pointing of the airborne antenna.
The BSU receives, from the SDU, aircraft azimuth and elevation and the satellite position.
It converts that data in order to control the electronic antenna to point its beam at the satellite.
The BITE of the BSU is performed by the SDU.

TOP-MOUNTED HIGH GAIN ANTENNA (HGA)

The HGA is top mounted with an adapter plate on the fuselage of the aircraft.
The HGA is an electronically steerable phased array. The BSU steer the antenna towards the satellite. It is linked to the HGA via an ARINC 429 bus.
Two bands are in use for simultaneous transmission and reception of satellite signals as a full duplex operation. The HGA sends to, and receives from, the D/LNA L-band radio frequencies through a coaxial cable.
The BITE of the HGA is performed by the SDU via BSU.

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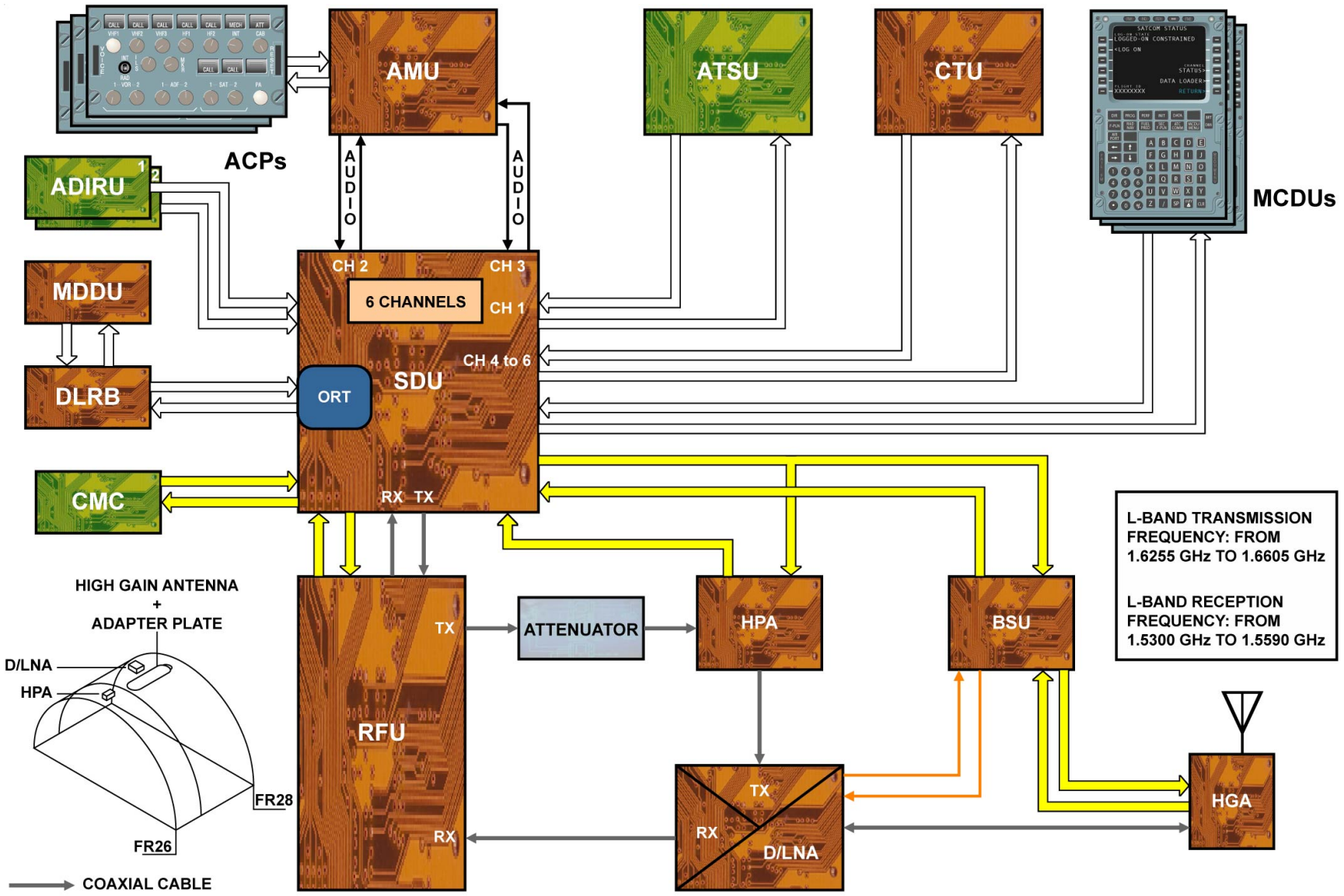

DESCRIPTION - RADIO FREQUENCY UNIT (RFU) ... TOP-MOUNTED HIGH GAIN ANTENNA (HGA)

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SATELLITE COMMUNICATION D/O (3)

OPERATION

Log-in is initiated by the SDU after selection of the log-on command on the MCDU SATCOM Menu.

LOG-IN PROCEDURE

PROGRAMMING

The SDU is programmed with two data tables. One called the ORT, contains information on all ground stations in each satellite region and the order of preference in which they are to be selected. The ORT is updated via the MDDU.
The second table, called the system table, contains system management and control information including all ground station channel frequencies and identifications and satellite positions. Each system table has a version number assigned to it.
The SDU is also programmed with a technical address, which is the «telephone number» of the aircraft. This technical address will become part of all messages sent.

COMMUNICATION LINK ESTABLISHMENT

The SDU carries out an initial search to find the best way to communicate with the ground.
The SDU receives aircraft position and orientation information from ADIRU 1. If ADIRU 1 doesn't send the information, the SDU will take the information from ADIRU 2.
BSU receive azimuth and elevation to direct the antenna towards the satellite.
The BSU convert azimuth and elevation commands into signals to direct the antenna towards the selected satellite.
Following the ORT and the system table, the SDU will select one by one the possible satellite and ground station it can connect to.
Each ground station continuously broadcasts a channel to inform users of system status and configuration. It also carries the time and frequency information needed by the aircraft wishing to log onto the system.
The SDU checks the quality of the received signal of each ground station tested, measuring strength and/or bit error rate. At the end of this procedure, the SDU selects the ground station corresponding to the best quality signal.

COMMUNICATION LOG-ON

The received ground station sends an electronic bulletin board, which also contains system table information. The SDU compares the version number of its system table with the received one. According to the content of the updated system table, the SATCOM may re-select the satellite at this point.
The SDU indicates to this ground station it has an updated system table and it is listening to it. The ground station identifies the aircraft by its technical address and registers the aircraft as operational in that region. At this point, the SATCOM is considered to be logged onto the system.

CALLS

CALL INITIALIZATION FROM AIRCRAFT

When an airborne subscriber initiates a call, the SDU sends a call request signal to the ground station. When the ground station receives the call request, it assigns a channel to the aircraft. The call can then go through. The assigned channels are reserved for as long as the call is in progress. The sequence used to initiate the call is automatic and transparent to both the originator and the receiver of the call.

SIGNAL PROCESS

The SDU combines all the received data from the AMU, ATSU and CTU in an IF Tx signal and sends it to the RFU.
The RFU converts signals from the SDU to a L-band radio frequency signal.

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The Tx signal follows the line to the antenna through the amplification chain to be transmitted to the satellite. The satellite will then route the signal to the ground station.
When the antenna receives information from the pointed satellite, the D/LNA will relay the Rx signal to the RFU. A conversion of the Rx L-band radio frequency signal is made into an IF Rx signal. The IF signal is sent to the SDU for demodulation and decoding. The SDU will then route the received signals to the concerned user.

REMARK

Calls initiated from the ground to a passenger are currently not allowed for safety reasons.

LOGON RENEWAL

If degradation or loss of the received signal is detected by the SDU after log on, the SDU will attempt to re-establish communication with its logged on ground station. If any signal is not received within 10 seconds, then the SDU will tune onto the next preferred ground station, referring to the ORT and the system table. During log on, renewal in the same satellite region, the flight information is not transmitted with the log on request.
If the channel of the next preferred ground station is not received within 10 seconds, the SDU will find itself logged off but will not transmit a log off request. Then the SDU will revert to a satellite search procedure.

COCKPIT VOICE

DIALING FEATURES

The use of the SATCOM cockpit voice facilities is made through the MCDU for dialing and the Audio Control Panel (ACP) for call establishment.
Two possibilities are offered to dial a number:
- pre-selected numbers, stored in the ORT and available under the DIRECTORY menu,
- manual dialing, using the scratchpad.

OUTGOING CALLS

Once the dialing is completed, SAT 1 (or 2) ACP transmission and reception keys must be selected. Green lines will flash during the call establishment.
When the call is established, these green lines become steady and the CONNECTED indication is displayed next to the channel selected.

INCOMING CALLS

Incoming calls to the flight crew are annunciated by the SELCAL buzzer (except if flight phase inhibition) and, on the ACP, by the flashing of the CALL legend of the SAT1 (SAT2) transmission pushbutton switch. In addition, on the SATCOM MAIN MENU, GROUND TO AIR CALL is displayed upon the concerned channel (SAT1 or SAT2), with the associated priority.
To answer the call, select the SATCOM channel on the SAT1 (SAT2) on the ACP. The green line on the SAT1 (SAT2) reception pushbutton switch comes on (steady).

FAILURE MONITORING

The SDU is interfaced with the CMC for BITE purposes via an ARINC 429 bus.
The RFU, HPA and BSU can be tested through the SDU via ARINC 429 buses. The BSU also provides HGA and D/LNA status.
When a ground-to-air SATCOM call with high priority (1,2 or 3) is set up, the Flight Warning Computer (FWC) generates the SATCOM ALERT memo on the ECAM.
The warning SATCOM FAULT is set up in case of SATCOM voice and data transmission failure.
The warning SATCOM VOICE FAULT is displayed in case of SATCOM voice transmission failure.

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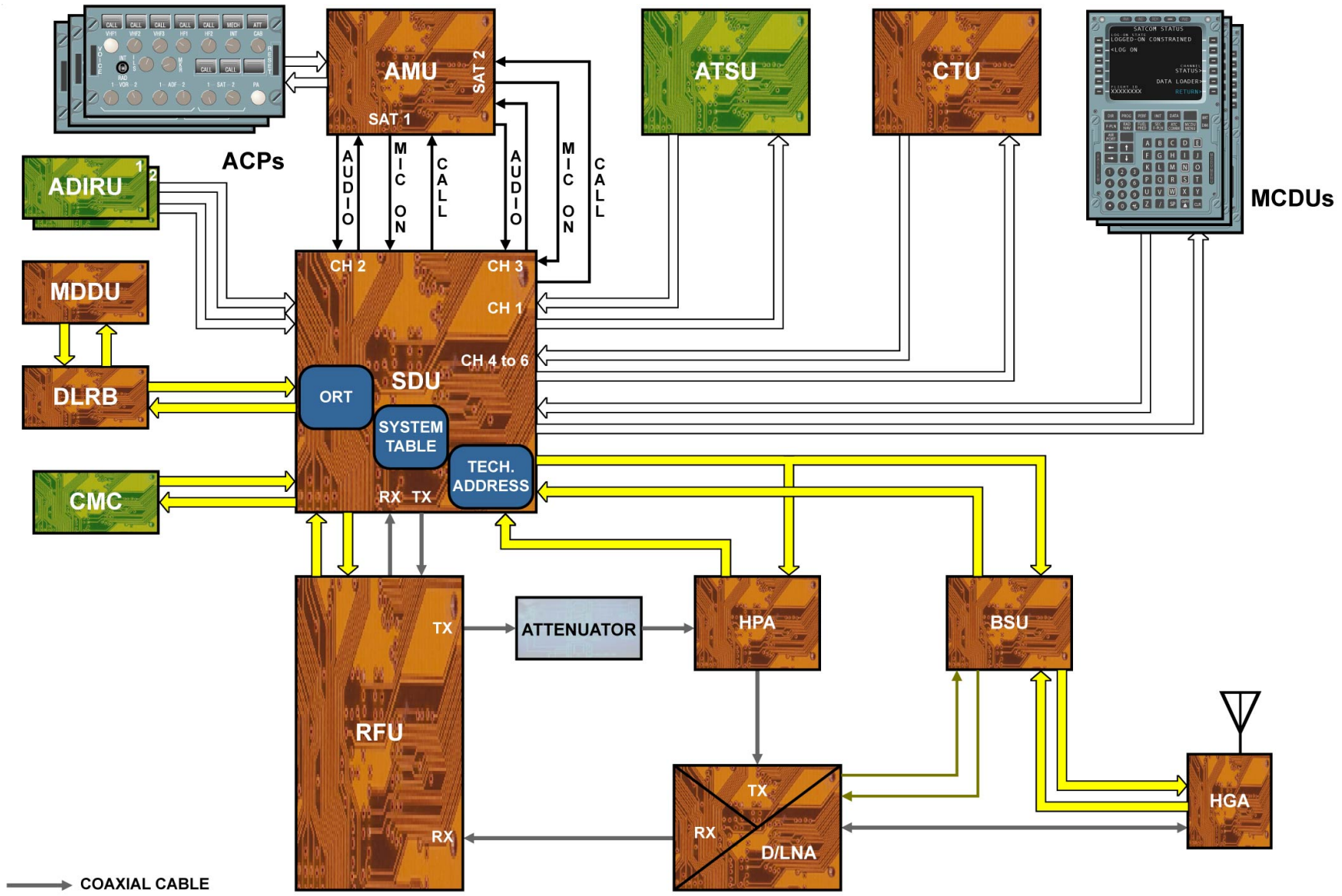

OPERATION - LOG-IN PROCEDURE ... FAILURE MONITORING

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SATELLITE COMMUNICATION D/O (3)

LOW GAIN ANTENNA (LGA) (OPTION)

On the basis of this architecture, a Low Gain Antenna (LGA) can be installed. The LGA system permits low rate transmission of data, in case of failure of the high gain antenna subsystem. This subsystem cannot ensure high rate data transmission or voice telecommunication.
The splitter is used to distribute the Tx signal to both the high gain system and the low gain system.
The combiner combines the Rx signals from the two D/LNAs before sending them to the RFU.
Note that the LGA doesn't need a BSU. The LGA is omnidirectional and non-adjustable.

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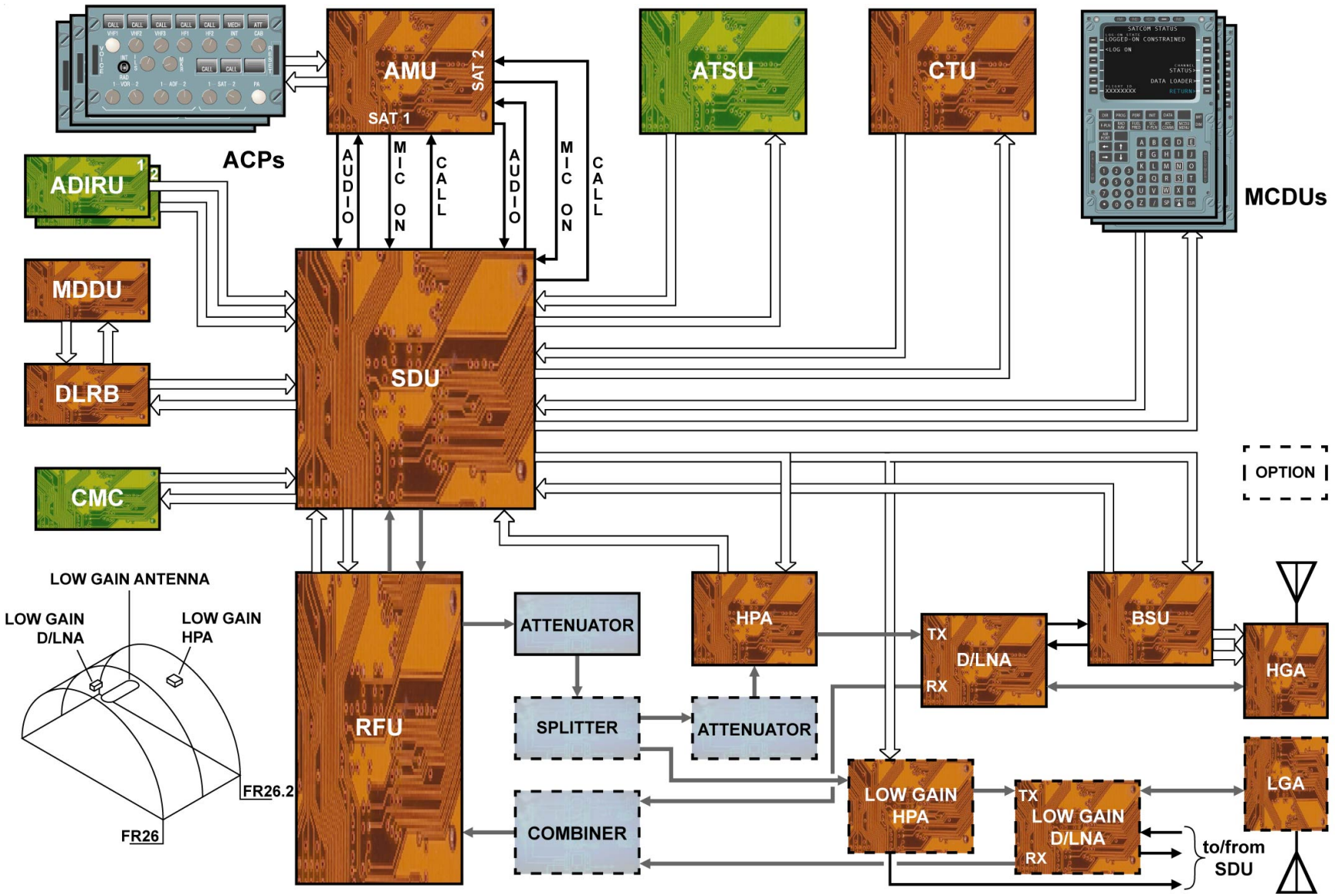

LOW GAIN ANTENNA (LGA) (OPTION)

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PA-CAB & SERVICE INTERPHONES FUNCTIONALITIES (2)

PASSENGER ADDRESS SYSTEM

The Passenger Address (PA) system is one of the main functions of the CIDS. PA signals are broadcast from the cockpit or cabin crew stations through all the cabin loudspeakers. To make PA announcements, the cabin crew uses the cabin handsets. The quickest way to initiate a PA from the cockpit is to use the cockpit handset, directly connected to the Directors. The cockpit crew can also send a PA using the PA key on the ACP and the cockpit acoustic devices.

A Pre-Recorded Announcements and boarding Music (PRAM) sends pre-recorded announcements and boarding music to the Directors to be broadcast through the PA system. There are two types of PRAM, which have identical functions. It can be a flash memory type plugged into the FAP or an audio tape reproducer installed in the avionics bay. The PRAM, whatever its type, is controlled from the FAP.

Note that PA announcements are also broadcast to the passenger headsets via the IFES. In the event of a PA, the cabin crew is informed by messages on the AIPs and the cockpit crew by a message on the EWD.

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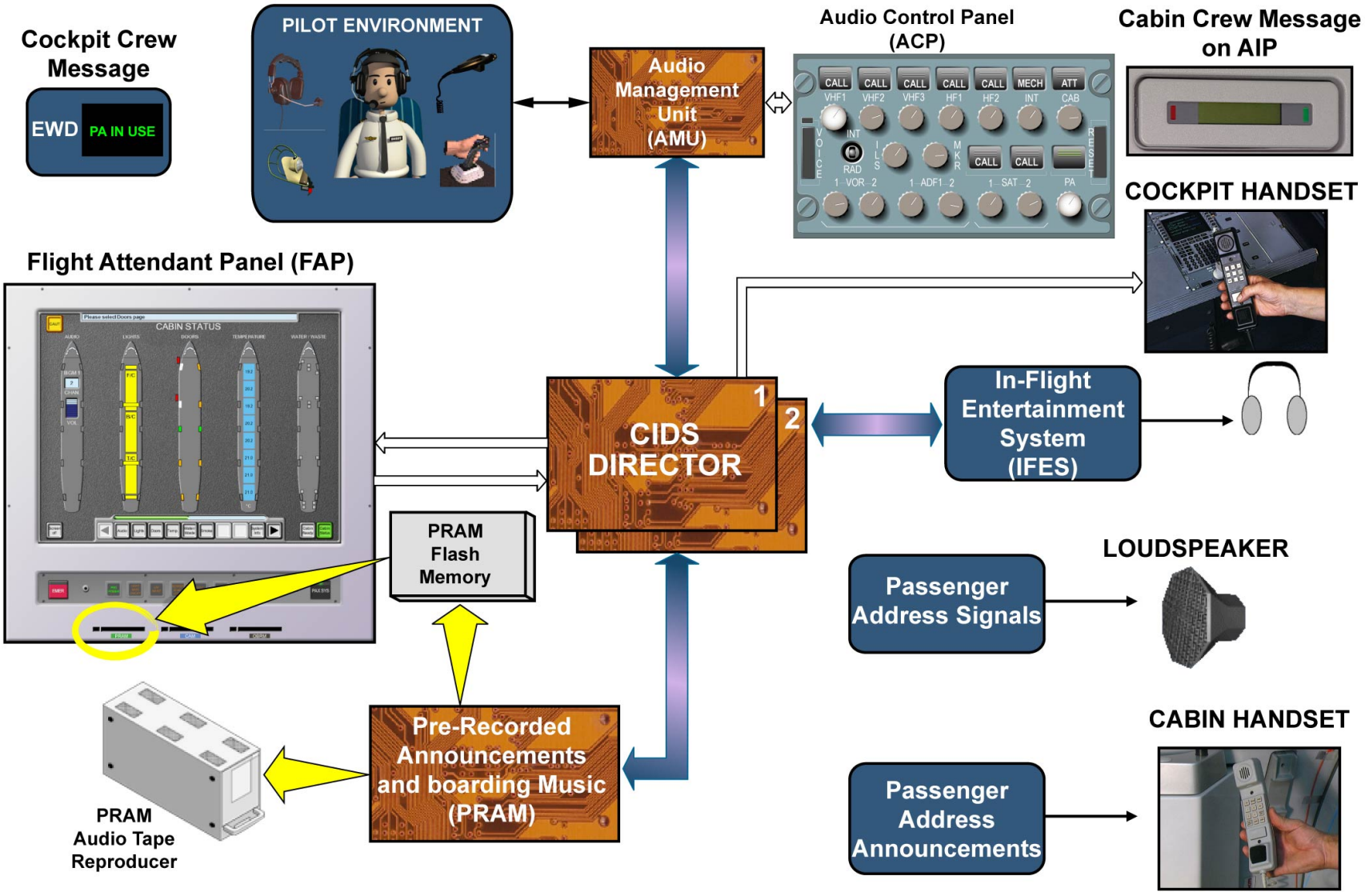

PASSENGER ADDRESS SYSTEM

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PA-CAB & SERVICE INTERPHONES FUNCTIONALITIES (2)

CABIN AND FLIGHT CREW INTERPHONE SYSTEM

The cabin and flight crew interphone system allows telephone communication between all cabin crew stations and the cockpit, via the cockpit handset or any cockpit acoustic device. The cabin crew can initiate a call to another cabin crew station or to the cockpit by dialing on the handset. To call the cabin crew from the cockpit, the overhead CALLS panel is used.

To speak to a cabin crew member from the cockpit, the CABin transmission key and the CABin reception key on the ACP are adjusted accordingly. In the cabin, the cabin crew is aware of a call by visual indication on the AIPs and ACPs, associated to the called station. Hi-lo chimes are also broadcast in the assigned zones through the cabin loudspeakers.

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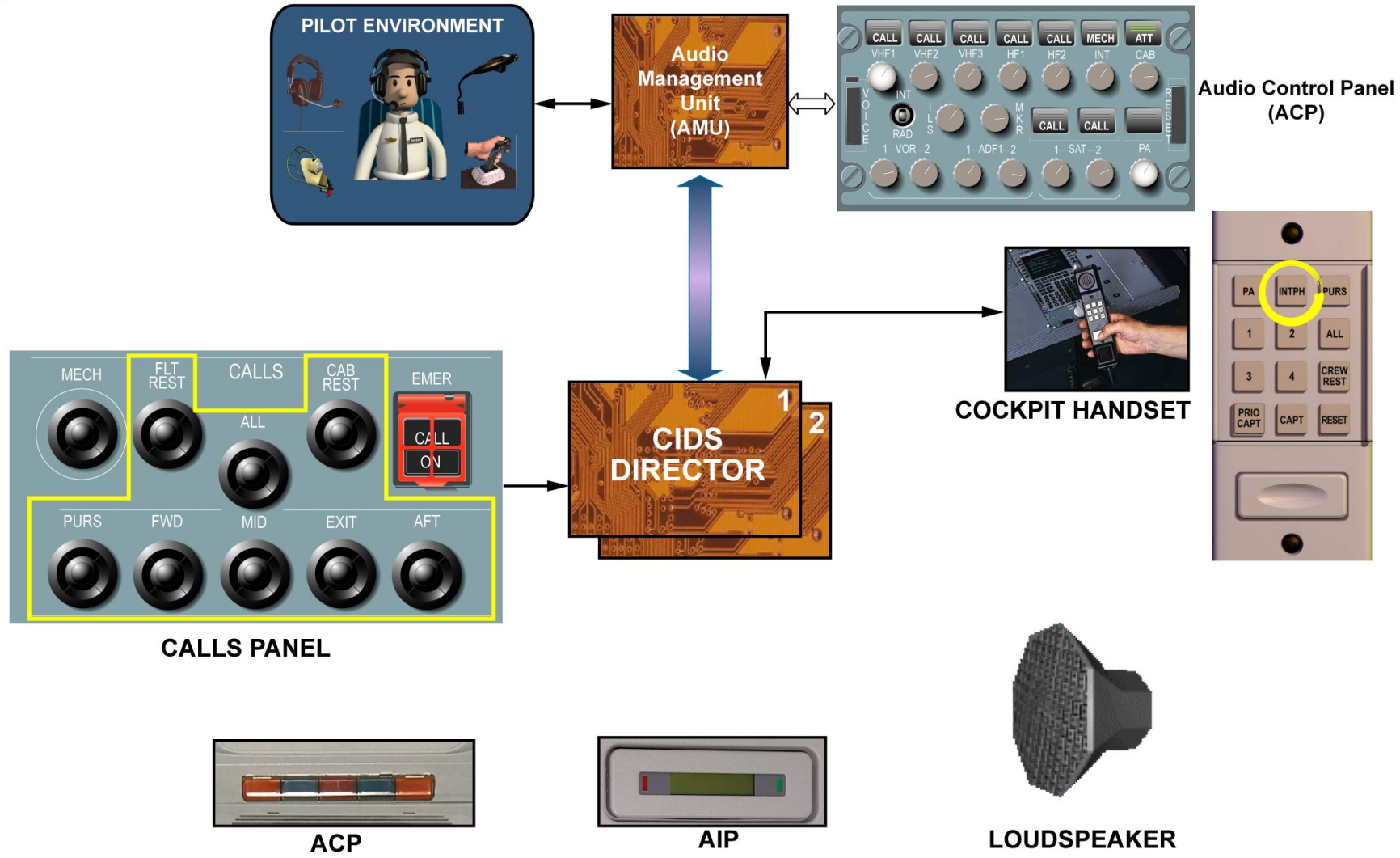

CABIN AND FLIGHT CREW INTERPHONE SYSTEM

PA-CAB & SERVICE INTERPHONES FUNCTIONALITIES (2)

SERVICE INTERPHONE SYSTEM

The service interphone system enables voice communications, on ground only, between the cockpit, the cabin crew stations and the service interphone jacks located around and in the aircraft. In the cockpit, the CABin key on the ACP must be pressed. In the cabin, the cabin crew has to press twice on the INTerPHone key on the handset to activate the service interphone function.
A display on the AIPs in the cabin will indicate that the service interphone is in use. If on-ground information is not sent to the Directors, the SerViCE INTerphone OVerRiDe pushbutton has to be set to ON to force the service interphone to work.

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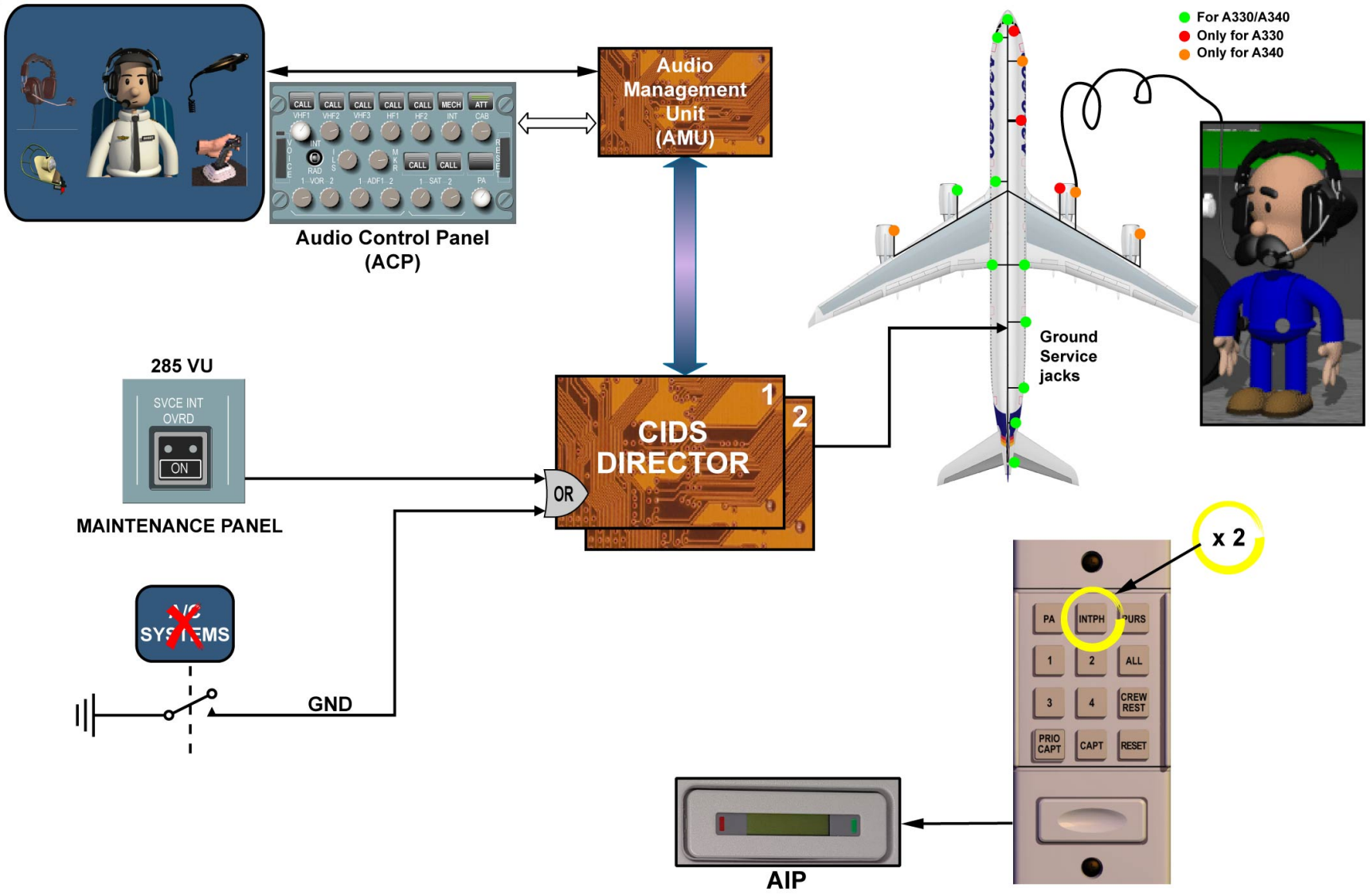

SERVICE INTERPHONE SYSTEM

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

GENERAL

The Cabin Intercommunication Data System (CIDS) is the cabin core system. It is designed to interface between cabin crew, cockpit crew and passengers.

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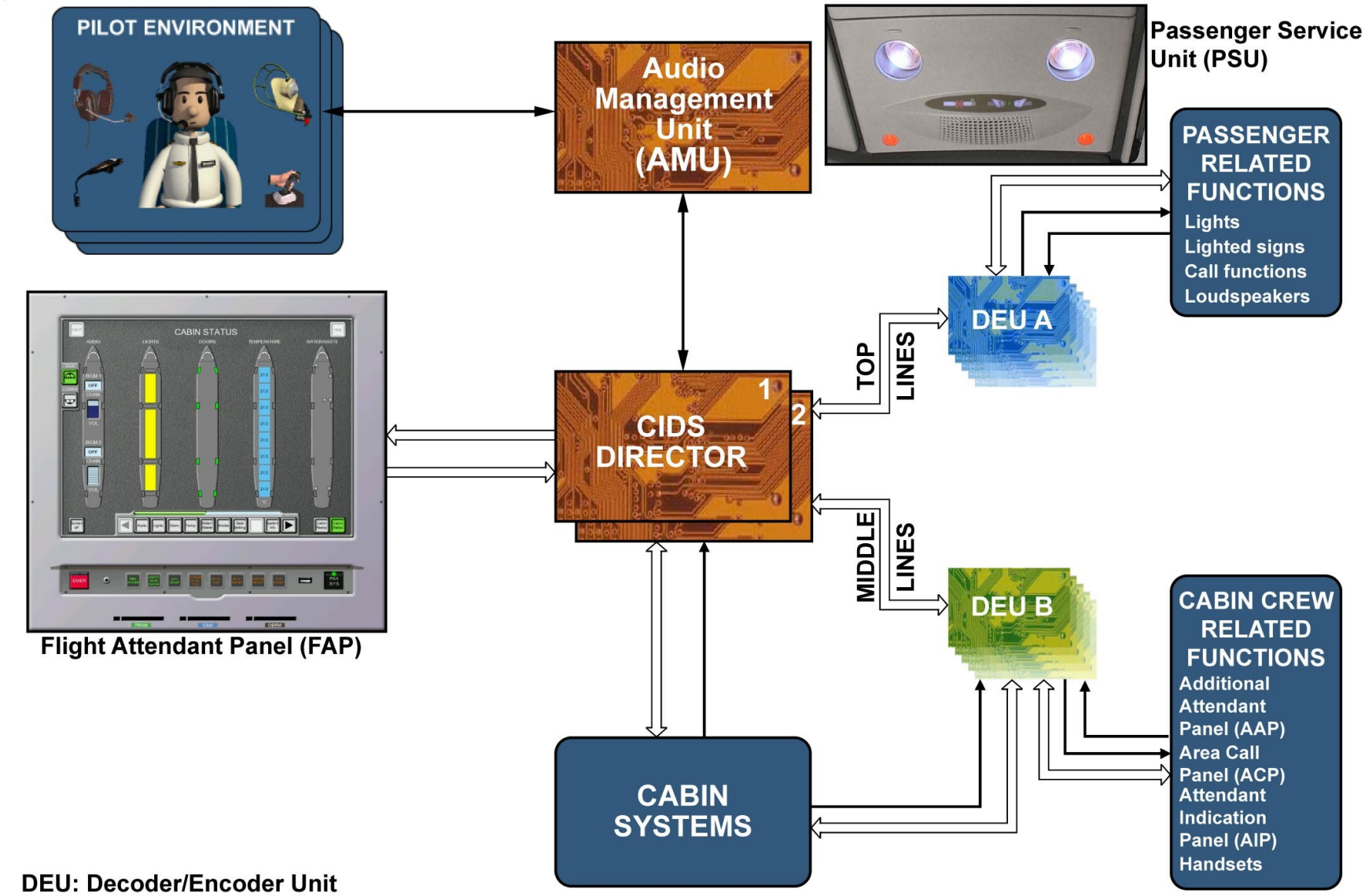
PILOT ENVIRONMENT
Audio Management Unit (AMU)
Passenger Service Unit (PSU)
PASSENGER RELATED FUNCTIONS
Lights
Lighted signs
Call functions
Loudspeakers
DEU A
TOP LINES
CABIN STATUS
CIDS DIRECTOR
1
2
MIDDLE LINES
DEU B
CABIN CREW RELATED FUNCTIONS
Additional Attendant Panel (AAP)
Area Call Panel (ACP)
Attendant Indication Panel (AIP)
Handsets
CABIN SYSTEMS
Flight Attendant Panel (FAP)
DEU: Decoder/Encoder Unit

GENERAL

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

GENERAL (continued)

DIRECTORS

The two Directors are the central control components of the CIDS. They are fully identical and have the same outputs and inputs.
They provide to each other their operational status through a discrete signal and data and failure information through ARINC 429 buses.In normal operation, Director 1 is operative and Director 2 is in hot stand-by. This means that Director 2 receives and computes the same data as Director 1 but its outputs are disabled.
The Directors are linked with the Flight Attendant Panel (FAP) through two wire types:
- by Ethernet for data exchange,
- by discrete for each hard key.

System reconfiguration for the installation of options, cabin reconfiguration or CIDS expansion is limited to software database changes. These database are the On Board Replaceable Module (OBRM) and the Cabin Assignment Module (CAM). They are downloaded from the FAP..
The CIDS is also designed to detect internal and external faults. The CIDS is a type 1 system. It is connected via the Directors to the Central Maintenance System (CMS) for maintenance purposes (BITE and tests).

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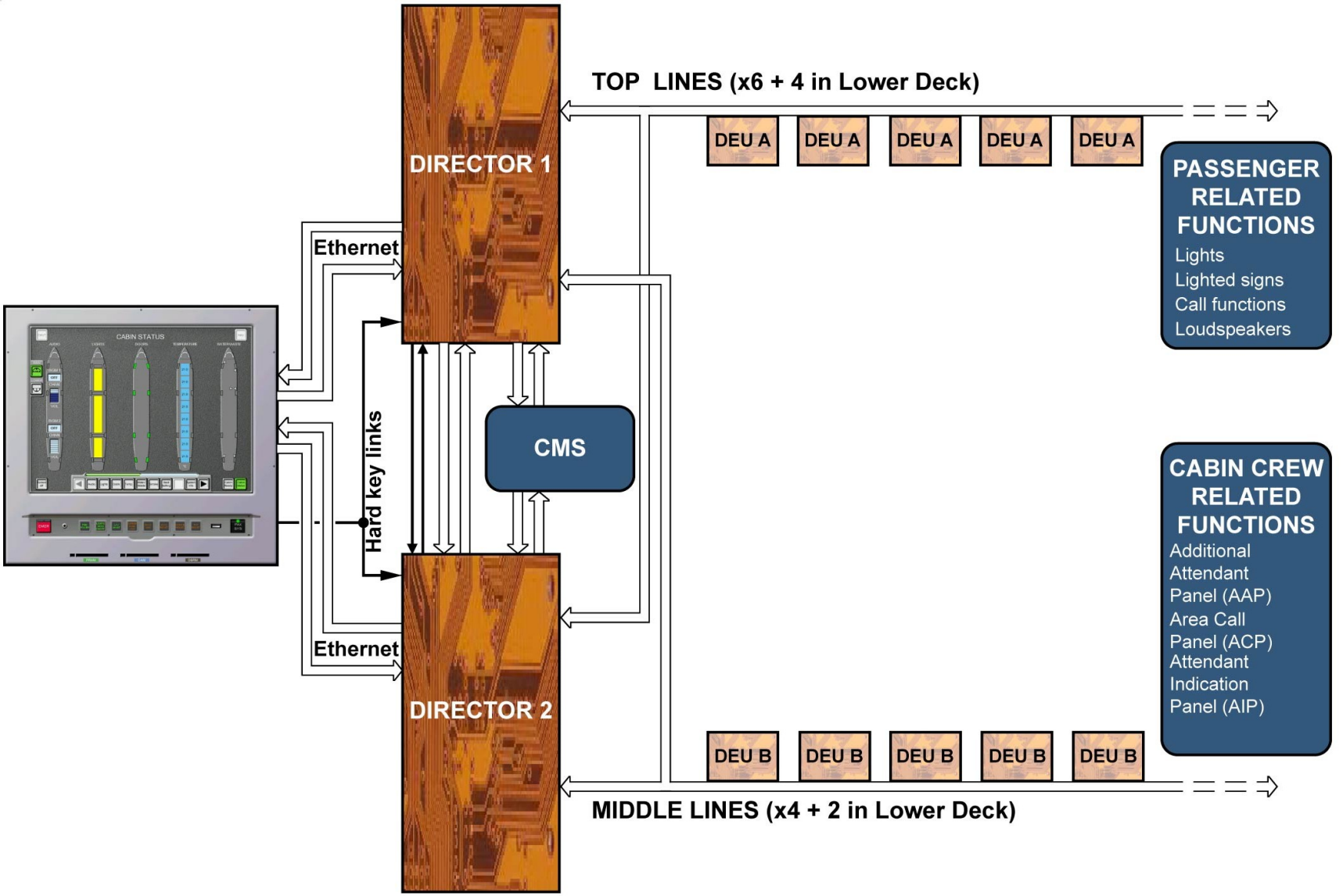

GENERAL - DIRECTORS

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

GENERAL (continued)

FLIGHT ATTENDANT PANEL

The FAP is used as the main user interface with the CIDS. It programs, controls and indicates the status of the CIDS and related cabin systems. It is made of a touch screen and a hard key panel.
The FAP display structure is made of different pages related to the different systems connected to the CIDS. The FAP has its own software to build the screens using data from the Directors.
On the top LH corner of the screen, the CAUTion button will turn from gray to amber in case of CIDS internal fault.A message related to this caution will be displayed on the heading row to indicate what to do (which page to select). Despite that, some system pages will come up automatically under failure detection.
The Screen Off button is located in the lower left corner of the touch screen. Pushing that button switches the screen off. The screen is also switched off if no input is made for more than 10 minutes. The screen is switched on again if you touch the screen or in case of an auto event.
The Cabin Status button on the bottom RH corner of the screen calls the CABIN STATUS page, which gives an overview of the cabin status; this concerns boarding music, cabin lights, doors, temperature and lavatories. This button will be green when the CABIN STATUS page is displayed or Grey if not.
At the bottom of the screen, the system and function keys are used for the navigation through the different pages.
The hard key panel is used for major functions, which have to operate independently from the FAP touch screen. The hard key panel contains all hard keys and some interfaces (USB and headset plugs) and is protected by a transparent cover.
The following hard keys are installed on the hard key panel:
- PED POWER to switch the Portable Electronic Device (PED) power on or off in all class seats,
- LIGHTS MAIN ON/OFF to switch the main cabin lights on or off (100% or 0%),
- LAV MAINT to switch lavatory lights on (100%),
- SCREEN 30 sec LOCK to lock the touch function of the screen and be able to clean it,
- EVAC CMD to initiate an emergency evacuation (if the purser is allowed to do so),
- EVAC RESET to reset the evacuation lights and audio alert,
- SMOKE RESET to reset the audio smoke alert,
- FAP RESET.

The following switches are installed on the hard key panel:
- EMER (light),
- PAX SYS to cut off the In-Flight Entertainment (IFE) system normally enabled at power-up.

The following interfaces are installed on the hard key panel:
- USB plug for PC connections,
- headphone plug to listen to boarding music or pre-recorded announcements before broadcasting them.

On the lower part of the FAP panel, partly hidden by the lining, 3 flash card readers are installed. The OBRM contains the system software. The CAM contains the system properties and cabin layout information. The third flash card is optional and is used to store the Pre-Recorded Announcement and boarding music Module (PRAM) message.

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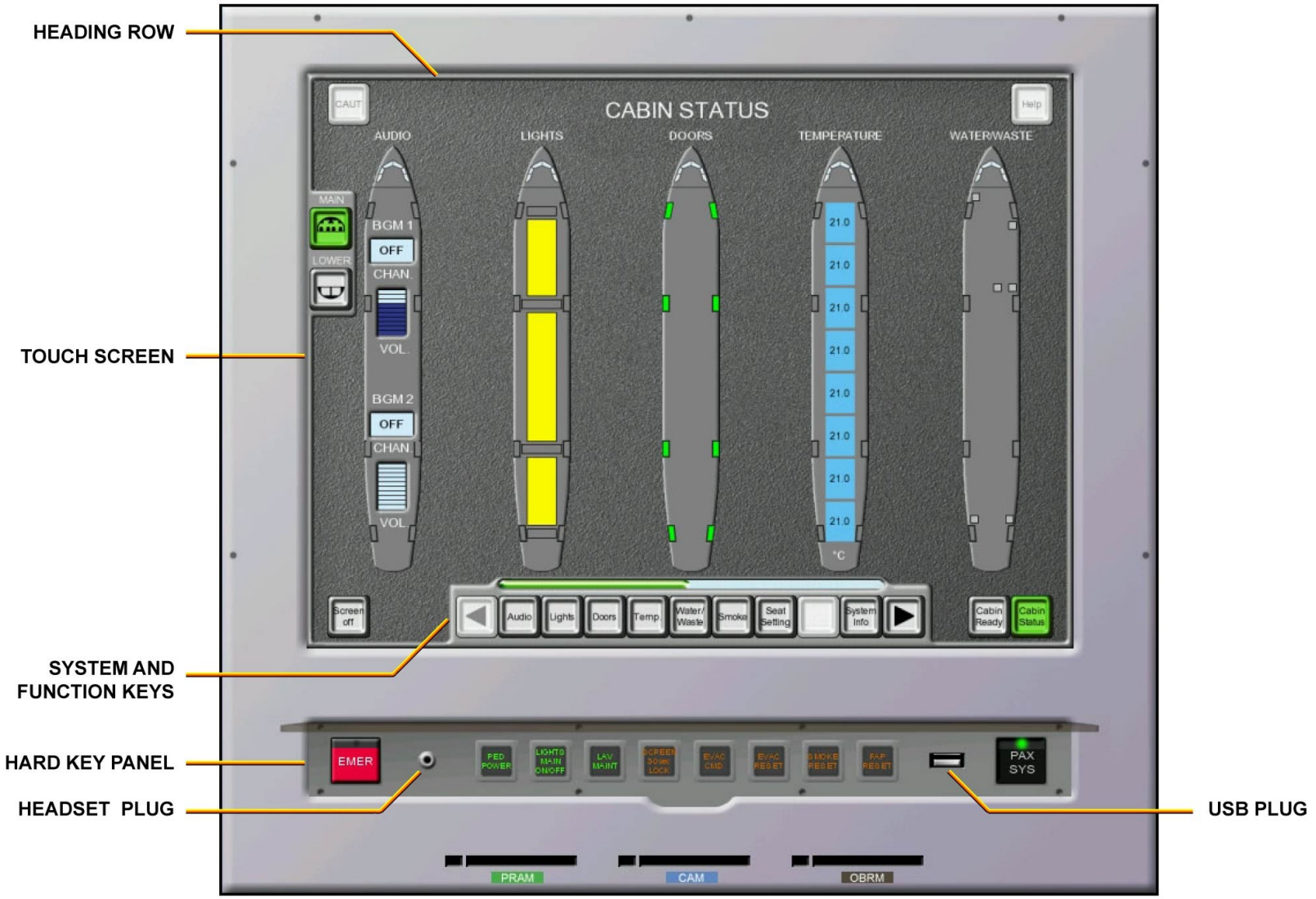

GENERAL - FLIGHT ATTENDANT PANEL

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

GENERAL (continued)

PASSENGER SIDE

Top line data buses link the CIDS Directors to type A Decoder/Encoder Units (DEUs) for passenger functions. Two top lines are installed along each aircraft side and two in the center of the aircraft and all are situated above the ceiling of the cabin. In case of lower deck facilities installation, 4 top lines are additionally installed.
Top lines are bi-directional serial high-speed data buses (4MB/sec.).
Each line is connected to the two Directors in parallel.
A failure of one top line disables all passenger functions on the DEUs connected to this top line.
The lines run through connection boxes. Each connection box is connected to a DEU A. It gives the DEU A its own address via the two coding switches.
Control commands and audio signals from the Director are decoded and transmitted to the respective connected equipment.

NOTE: Note that the last connection box on the top line includes a termination resistor for impedance matching.

Up to 63 type A DEUs can be installed in the cabin plus a maximum of 16 in the lower deck facilities. The CIDS uses each DEU A to control cabin illumination, signs, calls and cabin sounds according to cabin parameters programmed in the CAM.
The passenger functions are centralized in the Passenger Service Units (PSUs). They are connected to type A DEUs via a Passenger Interface and Supply Adapter (PISA). Up to 6 PISAs can be connected to each DEU A. The PISAs are installed in each PSU.
The PISAs are connected to the following equipment:
- reading-light switches and reading lights,
- PAX call button and call light,
- loudspeakers,
- No Smoking (NS), Fasten Seat Belt (FSB) and Return To Seat (RTS) signs.

The Advanced Integrated Ballast Units (AIBUs) are connected directly to the DEU A through an RS485 bus. They control general cabin lighting gradually using 128 dimming steps.
For special applications, it is possible to connect directly to the type A DEUs all cabin-related components such as:
- R/Ls via a Reading Light Power Supply Unit (RLPSU),
- signs,
- loudspeakers,
- classical ballast unit.

In normal mode, the service bus supplies 28VDC directly to the type A DEUs and to the PISAs. The system operates at full capacity.
In emergency mode, only the essential bus supplies 28VDC to the CIDS. In this configuration, the PISAs are supplied via the DEU A in order to activate FSB/NS signs.

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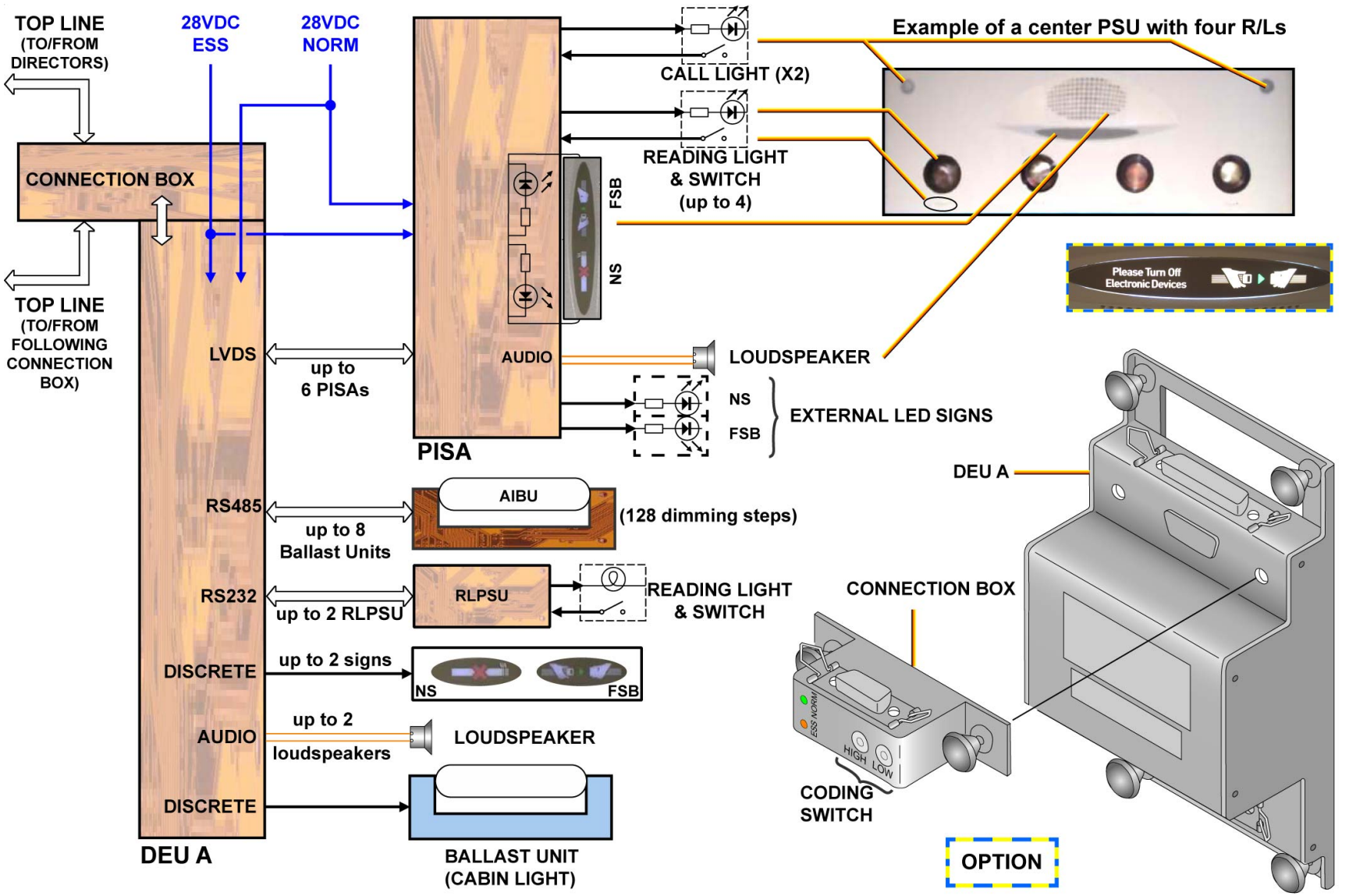

GENERAL - PASSENGER SIDE

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

GENERAL (continued)

CABIN CREW SIDE

Middle line data buses link the CIDS Directors to type B DEUs for cabin crew functions. One middle line is installed along each aircraft side and is situated above the ceiling of the cabin. If lower deck facilities are installed, 2 middle lines are also installed.
Middle lines are bi-directional serial high-speed data buses (4MB/sec.).
Each line is connected to the two Directors in parallel.
A failure of one middle line disables all connected DEUs B.
The lines run through connection boxes. These connection boxes are physically the same as the ones connected to the top lines.
Each connection box is connected to a DEU B. It gives the DEU B its own address via the two coding switches.

NOTE: Note that the last connection box on the middle line includes a termination resistor for impedance matching.

A physical mount device helps the mechanics not to mount a DEU A in place of a DEU B and vice versa.
Up to 15 type B DEUs can be installed in the cabin. In case of a double deck operation, the number of type B DEUs is limited to 12 in the cabin and 12 in the lower deck.
The CIDS uses each DEU B to control the different devices needed by the cabin crew.
The Attendant Indication Panels (AIPs), located in the cabin crew stations, indicate (in written form) PA, interphone and other system information to the cabin crew.
The Area Call Panels (ACPs), located on the ceiling near the cabin crew stations, draw the cabin crew's attention by illuminated fields.
The Additional Attendant Panels (AAPs), located in cabin crew stations, control certain cabin functions instead of the FAP.
Each attendant station is equipped with a handset for passenger address and interphone functions.

The following equipment can also be connected:
- Ice Protection Control Unit (IPCU),
- Emergency Power Supply Unit (EPSU),
- Autonomous Standby Power Supply Unit (ASPSU),
- Slide Release Power Supply Unit (SRPSU),
- slide and door sensors,
- call light.

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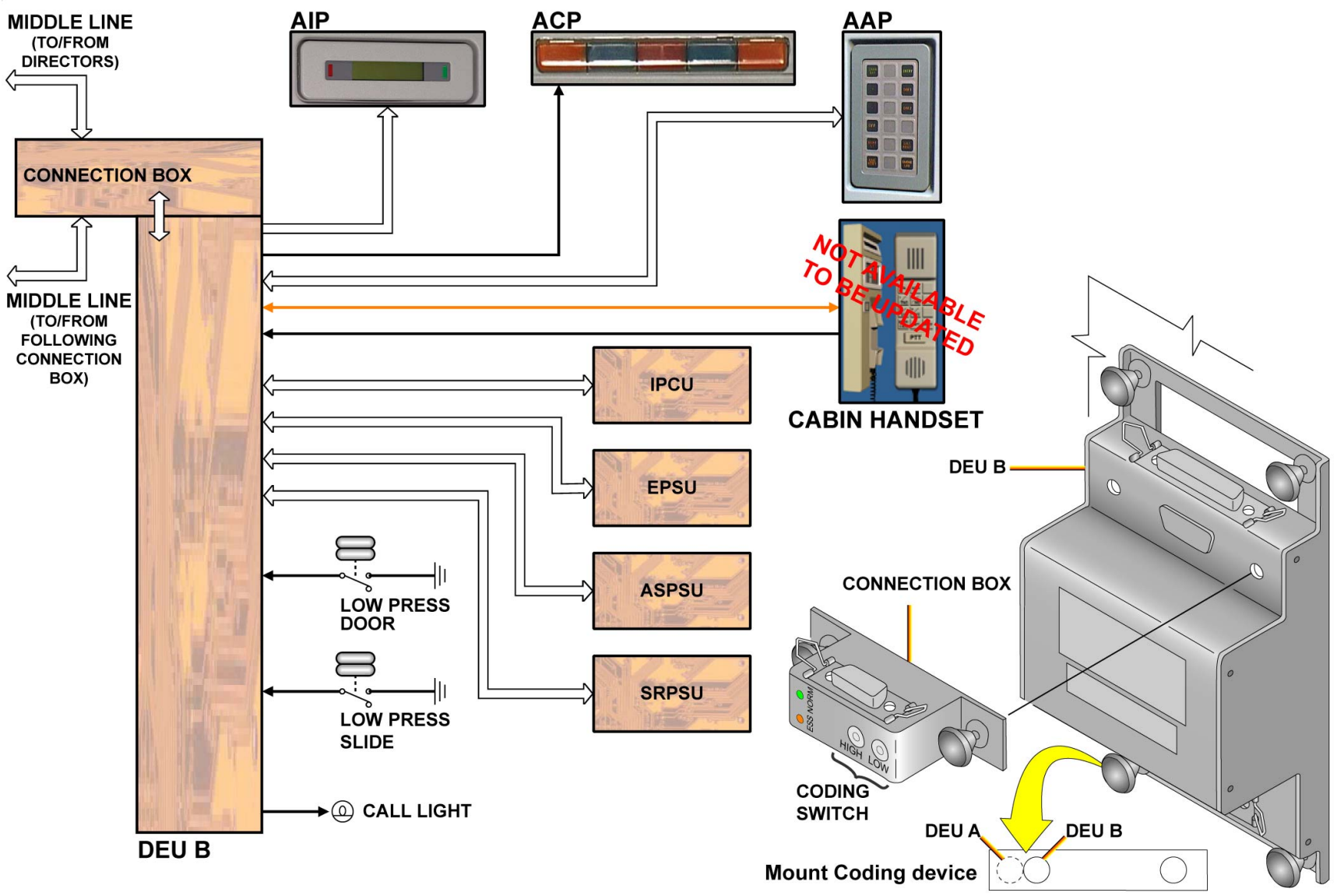

GENERAL - CABIN CREW SIDE

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

GENERAL (continued)

POWER SUPPLY

In normal mode, the service bus supplies all CIDS Directors and DEUs with 28VDC. The service bus is available on GND but is also the normal supply in flight.
The essential bus supplies power to the CIDS if the service bus is not available.
If the service bus is not available and the CIDS is in emergency mode, the power consumption is reduced to a minimum. Only the components that are needed for the minimum functions are supplied with electrical power.
The system operates in a downgraded capability mode. The remaining functions are:
- Passenger Address (PA),
- cabin interphone,
- EVAC,
- smoke indication.

The CABIN LIGHTS illumination is set to 100%.
The type A DEUs, which are connected to the top lines, are only supplied with power when an audio signal is present. If there is no audio signal, the active Director operates the top line cut-off relays to stop the power supply to the DEUs.
If a power interruption is longer than 5 sec., the CIDS software is reset and all the components of the system are set to the predefined status.
On ground reset is done through a total power-up test, lasting approximately 90 sec. In flight, a short power-up test will be done, lasting less than 20 sec.

NOTE: Note that the BITE and test functions are only active when the essential bus bar is also available.

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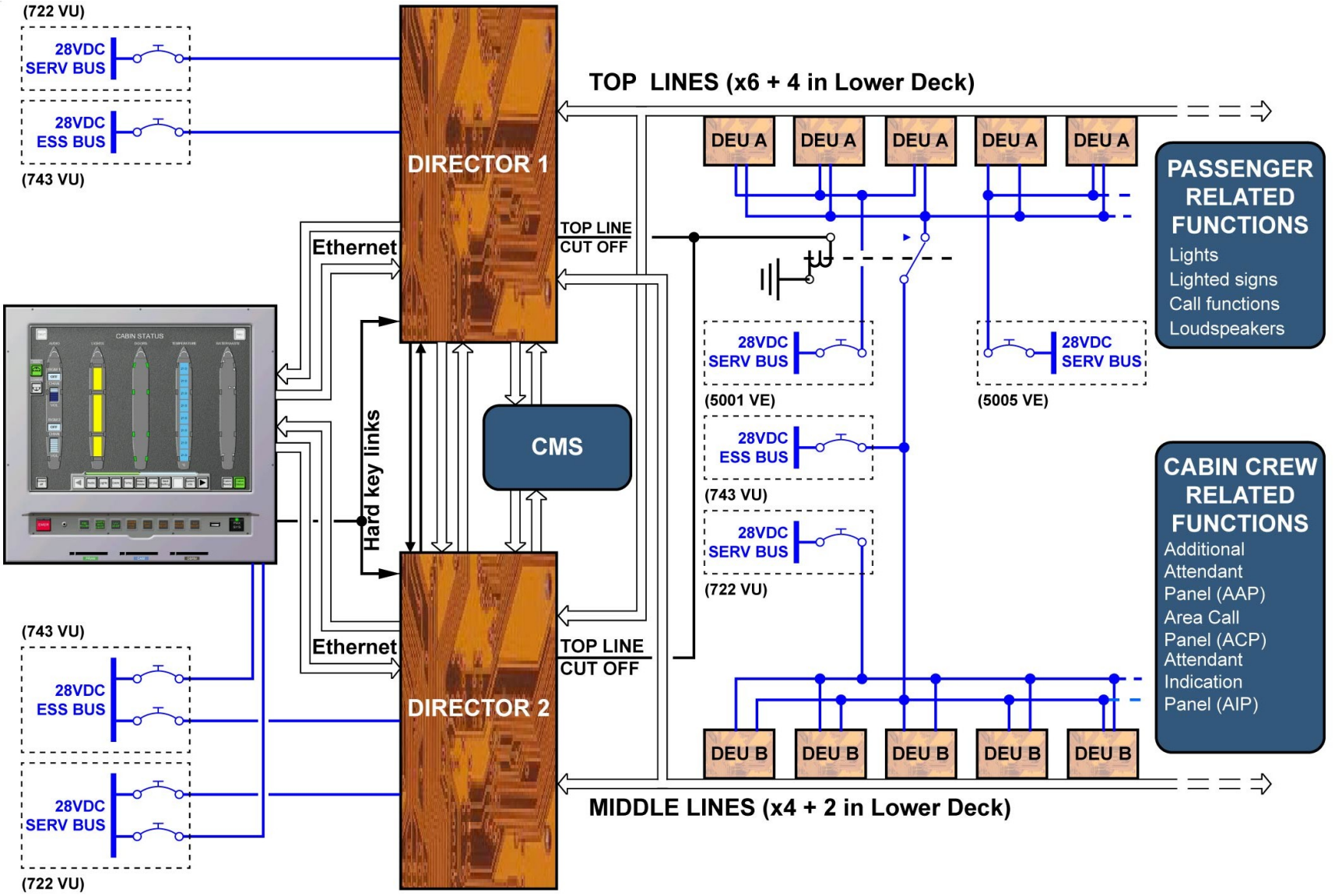

GENERAL - POWER SUPPLY

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION

The main page, called CABIN STATUS page, helps the purser to have an overall status of the cabin. This page is displayed automatically at power-up.
This page allows direct access to the 5 system pages, AUDIO, CABIN LIGHTING, DOORS, CABIN TEMPERATURE and SMOKE pages via the aircraft symbols.
All system pages are selectable by the system and function keys at the bottom of the screen. There are different sets of system and function keys. A set has a maximum of nine keys.
The different system pages will be described with their related system or function.

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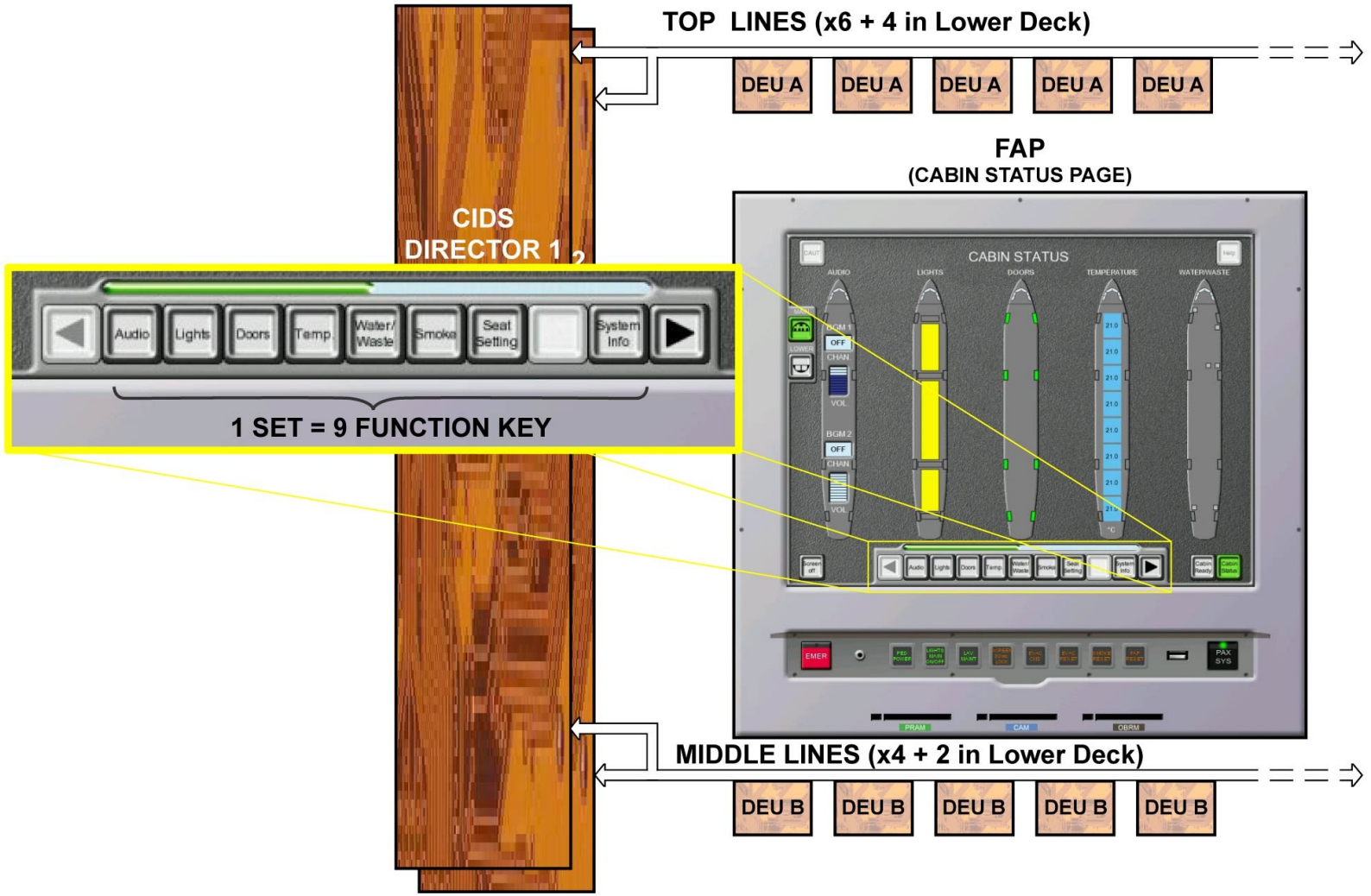
TOP LINES (x6 + 4 in Lower Deck)
DEU A
DEU A
DEU A
DEU A
DEU A
FAP
(CABIN STATUS PAGE)
CIDS
DIRECTOR 1
2
Audio
Lights
Doors
Temp
Water/ Waste
Smoke
Seat Setting
System Info
1 SET = 9 FUNCTION KEY
CABIN STATUS
AUDIO
LIGHTS
DOORS
TEMPERATURE
WATERWASTE
MIDDLE LINES (x4 + 2 in Lower Deck)
DEU B
DEU B
DEU B
DEU B
DEU B

OPERATION

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

PASSENGER ADDRESS AND BOARDING MUSIC

The passenger address system supplies the PA related announcements from the cockpit, the attendant stations, the PRAM and the IFE system to all assigned cabin loudspeakers.PA announcements are also transmitted through the passenger headset, if the IFE system is activated, in order to draw passenger attention.
Cockpit and cabin crew make PA announcements by using handsets. Basically, the cockpit handset has a Push To Talk (PTT) button only. Pushing this PTT button connects the handset to all loudspeakers. Optionally, it is possible to install a handset with an integrated keyboard. These functions are similar to the cabin crew handset.
The following functions are available:
- DIRECT PA: pushing the PTT button activates a link between the handset and all loudspeakers in the cabin and under-floor,
- PA ALL: pushing the PA button followed by the ALL and PTT buttons activates a link between the handset and all loudspeakers in the aircraft cabin,
- PA 1, 2 or 3: push the PA button followed by 1, 2 or 3 and the PTT button transmits the announcement to the corresponding zone.
Announcements can also be made to the crew rests (if installed).
Cockpit crew can also make PA announcements by using the acoustic devices and selecting the PA key on the ACP. The audio signal will then transit via the Audio Management Unit (AMU).
Optionally, an additional cabin hand microphone can be installed in the FWD area of the cabin (for DIRECT PA only).
When the PTT key is pressed, related to the direct PA function, the confirmation message "DIRECT PA/PA ALL IN USE" is displayed on all the AIPs and a high-lo chime is broadcast to all the cabin loudspeakers and passenger headsets. In the cockpit, the "PA IN USE" message is displayed on the left memo area of the ECAM EWD memo.
The function of the PRAM is to play pre-recorded messages. It also plays boarding music programs to the passengers through the aircraft PA system. It can be of the flashcard type, directly plugged into the FAP, or of the cassette or CD audio reproducer type connected with two ARINC 429 data buses to the CIDS Directors. The selection of pre-recorded announcements and/or boarding music is made on the AUDIO page of the FAP.
Depending on certain conditions, the PA level can be increased when engines are running or in case of rapid decompression.
The PA functions have priorities:
1- DIRECT PA,
2- all remaining PA functions.
The PA sources have the following priorities:
1- AMU,
2- cockpit handset,
3- purser station,
4- cabin crew handsets,
5- PRAM,
6- IFE system.
A source with higher PA priority interrupts a PA announcement from a source with lower priority. Only the announcement from the source with the higher priority is heard. However, there is an exception, if the lower priority source makes an announcement with a higher functional priority.

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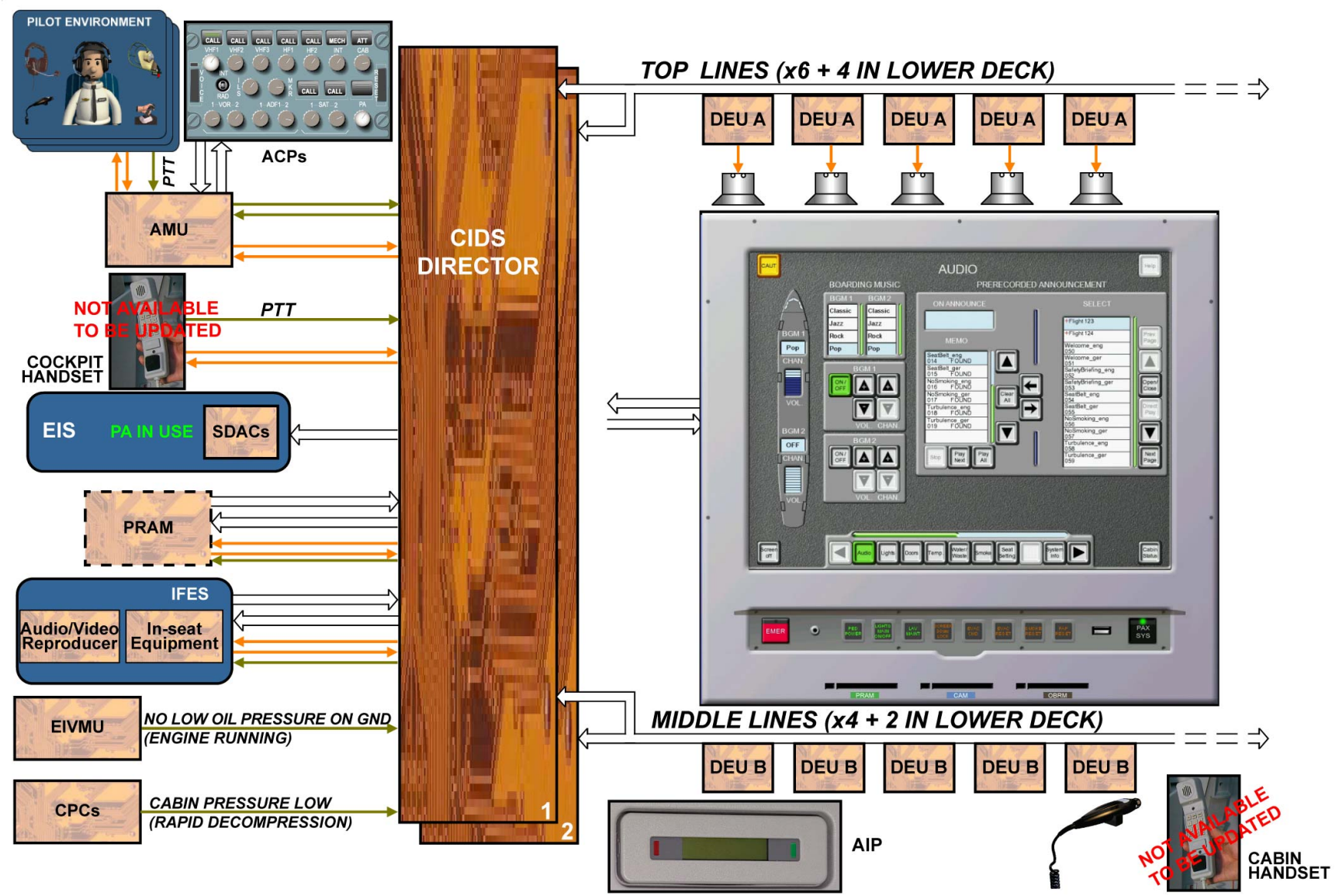

OPERATION - PASSENGER ADDRESS AND BOARDING MUSIC

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

INTERPHONE

The interphone systems will be used for the communication between cockpit crew, cabin crew and ground mechanics.
One or more links can be initialized at the same time. In conference mode, communication is possible between more than two interphone stations.
From the cockpit, interphone communications are initiated with the CALLS panel and via the equipment connected to the AMU (boomset, microphone and oxygen mask).
The following functions are available to call the cabin from the cockpit CALLS panel:
- EMER call (to call all cabin crew stations in emergency mode),
- ALL call (to call all cabin crew stations),
- PURS call (to call the purser),
- FWD call (to station at door 1),
- MID call (to station at door 2),
- EXIT call (to station at door 3),
- AFT call (to station at door 4).

When they are installed, it is also possible to call the crew rest stations.

NOTE: Note that, before initiating an interphone link with the cabin, the pilot must select the cabin transmission key and reception knob on the ACP.

As an option, it is possible to supply the audio signal, from the interphone station in use, to the AMU. The cockpit crew can listen to the announcement as long as no link to the AMU is established. Side tone and cabin attendant messages can be listened to through the cockpit loudspeakers. This monitoring function is also available when using the cockpit handset equipped with the optional integrated keyboard.
Calls from the cabin are initiated with the cabin handset.
At the cabin level, the following interphone functions are available from each handset:
- PRIO CAPT (to call the cockpit in emergency mode),
- INTPH + CAPT (to call the cockpit in normal mode),
- INTPH + PURS (to call the purser),
- INTPH + ALL (to call all attendant stations in the cabin),
- INTPH + 1, 2, 3 or 4 (to call the corresponding cabin crew stations),
- INTPH + CREW REST + 1 (to call the Flight Crew Rest Compartment (FCRC) if installed),
- INTPH + CREW REST + 2 (to call the Lower Deck Mobile Crew Rest (LDMCR) if installed).

The functions have different priorities:
1- EMERGENCY CALL,
2- CALLS FROM COCKPIT,
3- ALL ATTENDANT CALL,
4- NORMAL CALL.
The sources have the following priorities:
1- AMU (cockpit),
2- cockpit handset,
3- cabin handsets.
A source with higher priority interrupts a link to an interphone station with a lower priority. A source with lower priority and a selected function with higher priority also interrupts an existing link.
In the cabin, a chime will be activated in the respective cabin area.
If the call is assigned to the cockpit, the aural annunciation is done by the activation of the cockpit buzzer via the Flight Warning Computer (FWC). The FWC receives the respective signal from the active Director.
During the dial procedure, the dial information is displayed on the related AIP. After finishing the procedure the respective light segment in the ACP comes on and the related message is shown on the assigned AIP. The Directors will know each AIP and ACP location thanks to

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the CAM data where the attendant station is situated, according to the connection box codes.

The reset function of an interphone on the handsets occurs after hanging up or after pushing the RESET button. This reset function is automatically activated after approximately 5 minutes, when no requested handset accepts the call.

In the cockpit, the emergency call indicator (for EMER CALL only) and the ATT light on the ACP are activated according to the initiated call.

The service interphone system enables voice communications, on ground only, between the cockpit, the cabin crew stations and the service interphone jacks located in and around the aircraft.

In the cockpit, the CABin key on the ACP must be pressed. In the cabin, the cabin crew has to press twice on the INTerPHone key on the handset to activate the service interphone function.

A display on the AIPs in the cabin will indicate that the service interphone is in use.

If Landing Gear Control and Interface Unit (LGCIU) on-ground information is not sent to the Directors, the SerViCE INTerphone OVerRiDe P/B has to be set to ON to force the service interphone to work.

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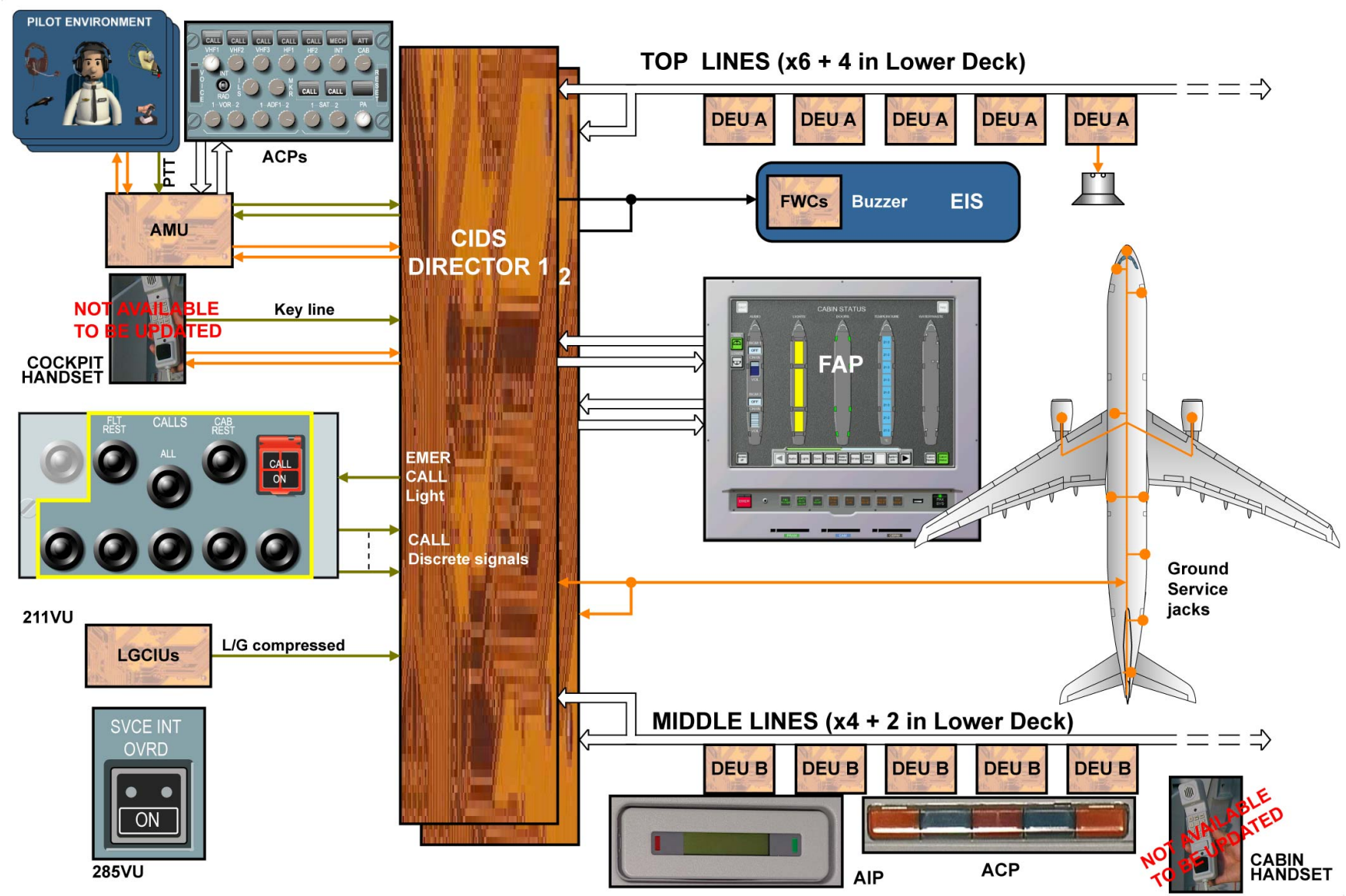

OPERATION - INTERPHONE

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

PAX SIGNS

The passenger lighted-signs system controls the NS, FSB, RTS and EXIT signs.
The control switches for the signs are located on the SIGNS panel on the cockpit overhead panel.
Except for the EXIT sign, these signs are connected to a PISA and are controlled by the Directors via type A DEUs. The EXIT signs are controlled by the Directors via the EPSU.
Some remote signs are not connected to a PISA: they are generally located in the galley/entrance areas or lavatories (e.g. RTS sign).
As an option, it is possible to install NO PED signs instead of NS signs. As an option, it is possible to install Pictogram Signs. These signs are controlled independently from all other signs (automatic activation under CAM programmed conditions) and are connected to PISA via type A DEUs and/or type B DEUs.
When the FSB control switch is in the OFF position, all FSB and RTS signs are OFF.
The FSB control switch in the ON position sets a Director discrete to ground and the active Director sends a signal to the type A DEUs.
The DEUs switch on all FSB signs and the RTS signs.
The FSB control switch in the AUTO position sets a Director discrete to ground to activate the FSB and RTS signs in case of:
- L/G down and locked (LGCIU) or slats or flaps extended (SFCC),
- engines running (EIVMU).

The FSB sign ON status is sent to the System Data Acquisition Concentrator (SDAC) and a FASTEN SEAT BELT message is initiated on the ECAM display.
The NS control switch in the ON position sets a Director discrete to ground and the active Director sends a signal to the type A DEUs.
The DEUs switches on all NS sign.
The NS control switch in the AUTO position sets a Director discrete to ground to activate the NS and EXIT signs in case of L/G down and locked (LGCIU) or slats or flaps extended (SFCC).
The NS sign ON status is sent to the SDAC and a NO SMOKING message is initiated on the ECAM display.
The NS control switch in the OFF position switches off all NS and EXIT signs. Only the NS signs in the no smoking areas are constantly switched on.
The no smoking areas are defined on the CABIN PROGRAMMING page of the FAP.
On the FAP, on the CABIN PROGRAMMING page, you can activate the NON SMOKER A/C function. All NS and attendant NS signs are switched on, regardless of the position of the cockpit switches.
In case of cabin decompression all NS and FSB signs are switched on, regardless of the position of the cockpit switches. The RTS signs are switched off.
Upon activation of the NS or FSB signs, the signs flash for 5 seconds and then remain on.
Activating and deactivating the NS or FSB signs initiate an attention chime in the cabin.
Additionally, the active Director transfers the FSB and NS signs status to the PRAM in case of special announcements and/or boarding music.
Optionally, it is possible to dim or brighten the signs, when the general illumination dimming comes to a predefined level. When the intensity of the cabin illumination is below this level, the signs are dimmed to a set level. The time for dimming the signs is programmable. When the cabin illumination is above this level, the signs are set to bright in the same way.

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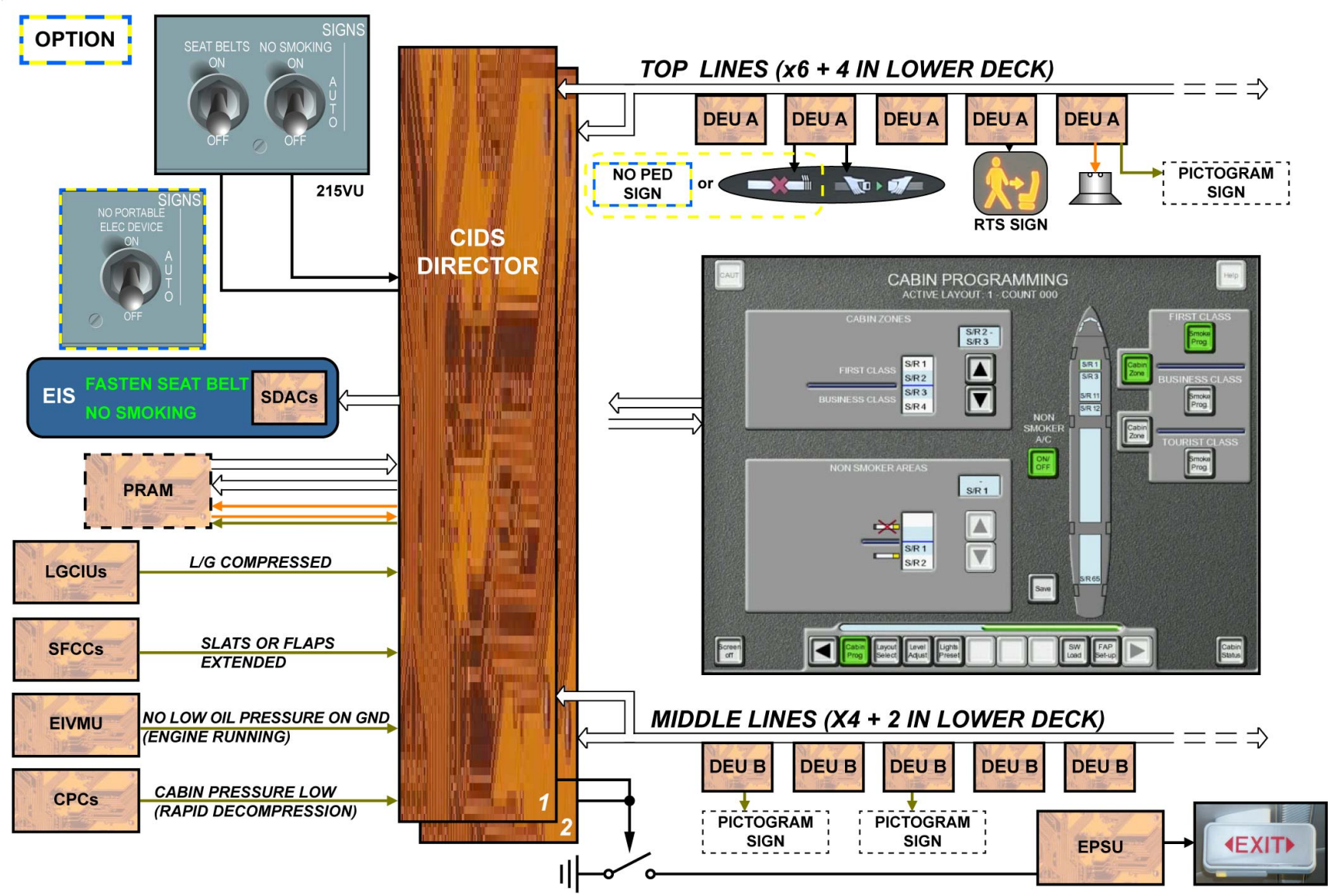

OPERATION - PAX SIGNS

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

PAX CALL

The passenger call system controls the passenger call activation and indications.

A passenger call is initiated by pushing the PAX CALL button at each seat row (PSU) or in the lavatory. The call can also be initiated from the Passenger Control Unit (PCU), which is located in the armrest of each seat.

When the PAX CALL button is pressed, a signal is sent to the Directors, via the DEU A or the IFE system. The active Director will then send a signal to the DEU A to switch on the related call light. At the same time, it will switch on the respective ACP light segment and a related message shows the location on the AIP.

A call chime is heard from all loudspeakers in the respective cabin area upon call activation. As an option, it is possible to suppress the chime activation if a predefined number of calls is active in one zone.

Pushing the CALL button a second time resets the call indications. The respective call light and the AIP indications for this call go off. The assigned ACP goes off only if no other call assigned to this ACP is active.

Pushing the Call Reset button on the AUDIO page of the FAP or on the AAP resets all calls in the assigned zone. The reset command includes the reset of all passenger call indications.

After pushing the Chime Inhibit button on the AUDIO page of the FAP, the call chime is inhibited. All visual indications remain. This function is only available for calls coming from seat rows. As an option, it is possible to activate this function on the assigned AAP.

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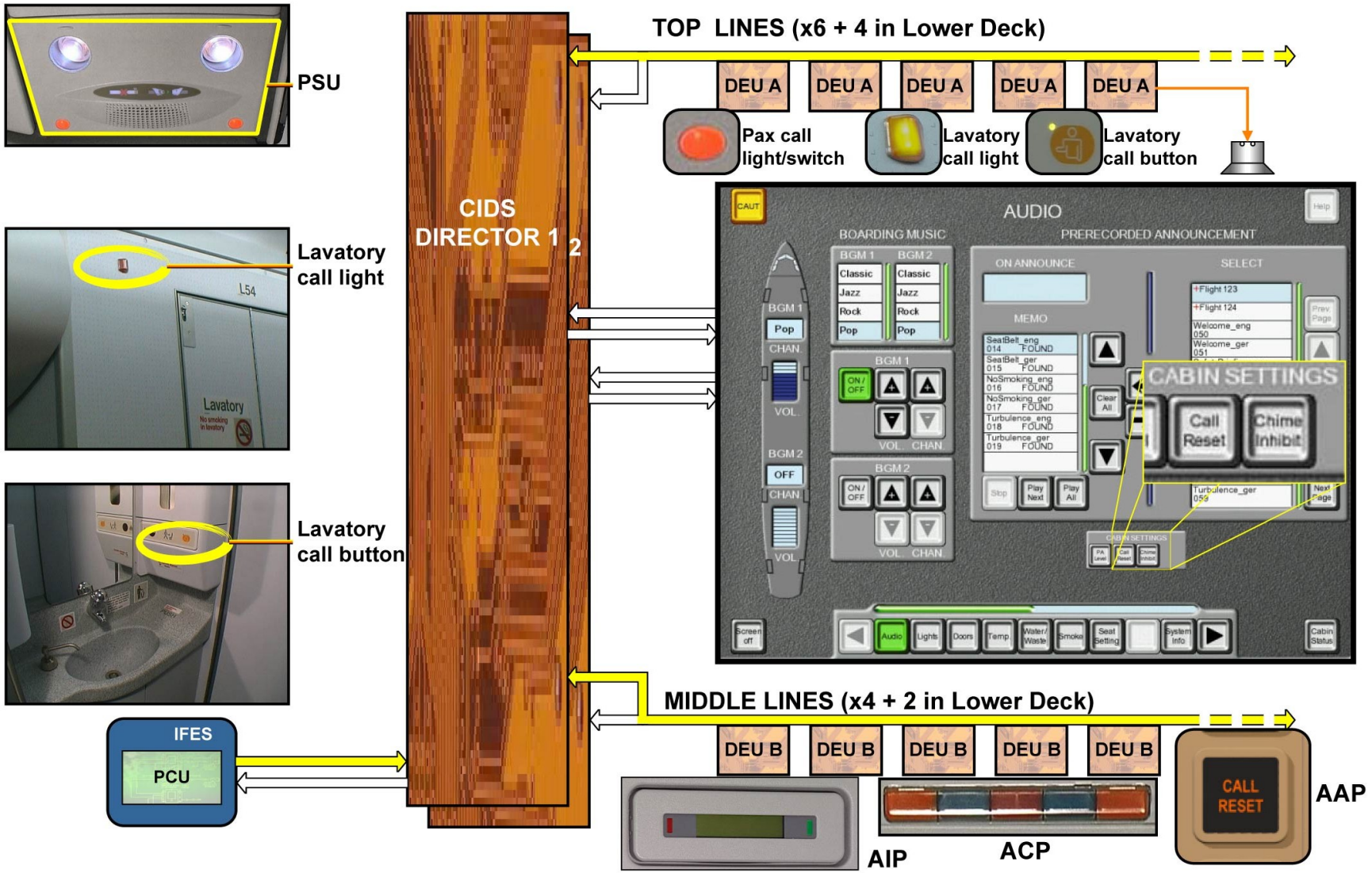

OPERATION - PAX CALL

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

CABIN LIGHTS

The cabin illumination system controls the illumination in the different areas. The cabin illumination is controlled from the CABIN LIGHTING page on the FAP or via buttons on the AAPs.
The FAP settings are sent to the CIDS Directors. The AAP settings are sent via the respective DEU B to the CIDS Directors. The active Director controls, via type A DEUs, the light tube intensity of the ballast units.
When the CIDS is not active, all CIDS controlled lights are set to full brightness. At the end of the CIDS power-up test, the lavatory lights are dimmed, all other cabin lights remain at full brightness.
On ground, the Main On/Off button sets all cabin and reading lights. Predefined intensity levels (BRT, DIM 1, DIM 2, Board, Climb or Cruise), fine adjustment or sequences can be selected. Pre-programmed scenarios make the cabin lights go from the actual intensity level to a predefined one in a certain time. Predefined intensity levels and sequences are programmed in the CAM.
In NIGHT light mode, the normal illumination is switched off and the tubes assigned as night-lights are switched on. The night-lights are part of the general illumination in certain dimming conditions (CAM programmed data).
As an option, it is possible to install a night light application, which is connected to the EPSUs. These special night-lights (Dot Lights) are switched on if the NIGHT light mode is selected. The dot lights are controlled from the CIDS Directors via the respective type B DEUs and the EPSUs.
With one or more engines running (oil pressure information sent by the EIVMU), the light intensity is dimmed automatically in the FWD entrance area if the cockpit door is open.
In case of rapid decompression information sent by the Cabin Pressure Controllers (CPCs), all lights are switched on at full brightness whatever the other settings.
The Reading Lights (R/Ls) are installed in the PSUs.
The P/Bs on the PSUs and the seat-mounted PCUs control the R/Ls.
If the R/Ls are switched on/off from the PSUs, a signal is sent directly to the PISA or RLPSU.
If the R/Ls are switched on/off from the PCUs, a signal is sent via the IFE system to the Directors, which transmit a signal via the type A DEUs to the PISA or RLPSU.
On the CABIN LIGHTING page, two buttons are used for the R/Ls. These two buttons are available only on ground for maintenance purposes.
The R/L Set button switches on all the R/Ls.
The R/L Reset button switches off all the R/Ls.

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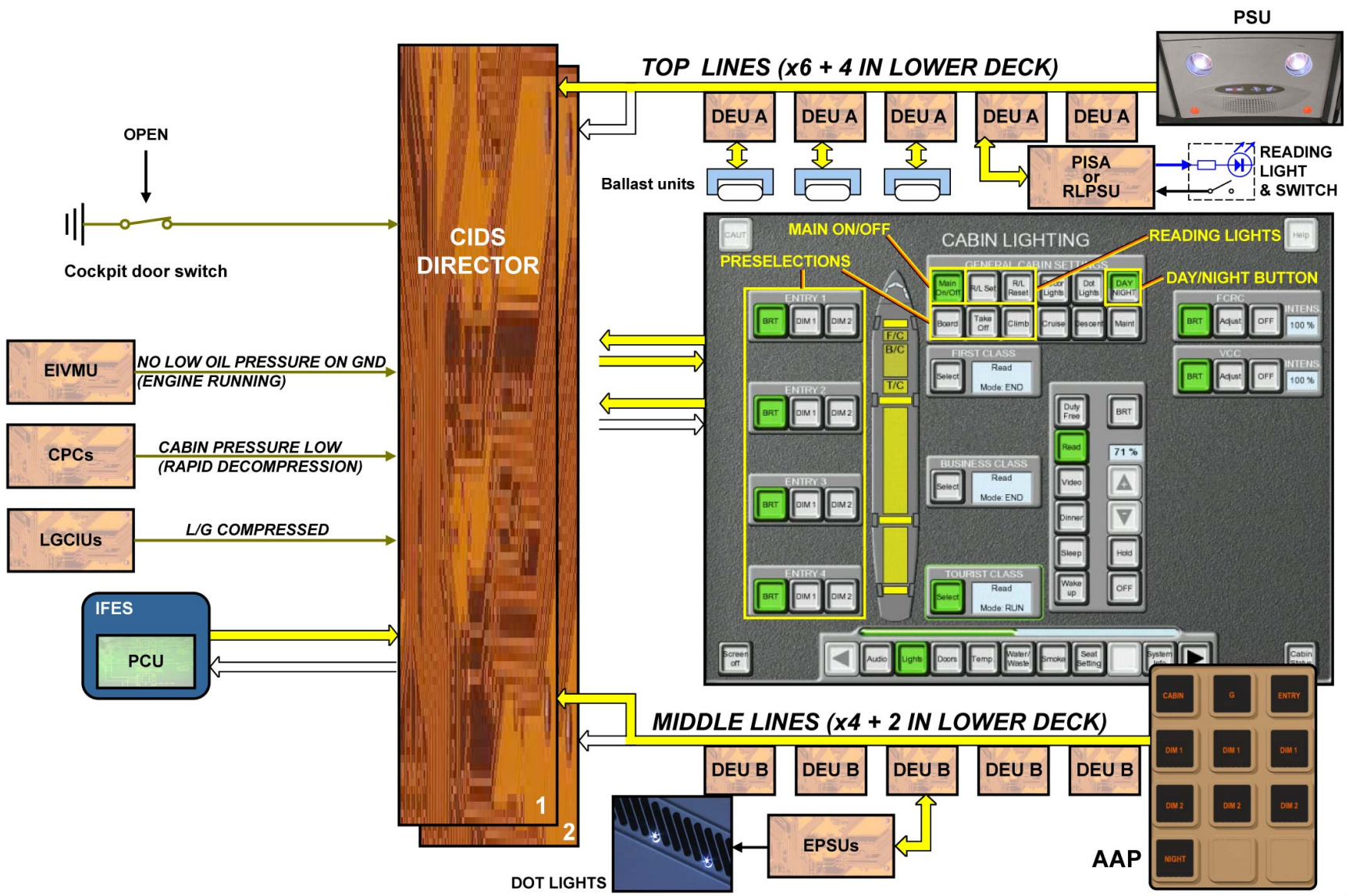

OPERATION - CABIN LIGHTS

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

DOORS/SLIDES

The DOORS/SLIDES page of the FAP shows the status of each door (open/closed) and slide (armed/disarmed) and the status of each door bottle and slide bottle in case of low pressure.
The status of the doors and slides are transmitted from the SDAC to the Directors.
The pressure sensors send the signals via the related type B DEUs to the Directors.

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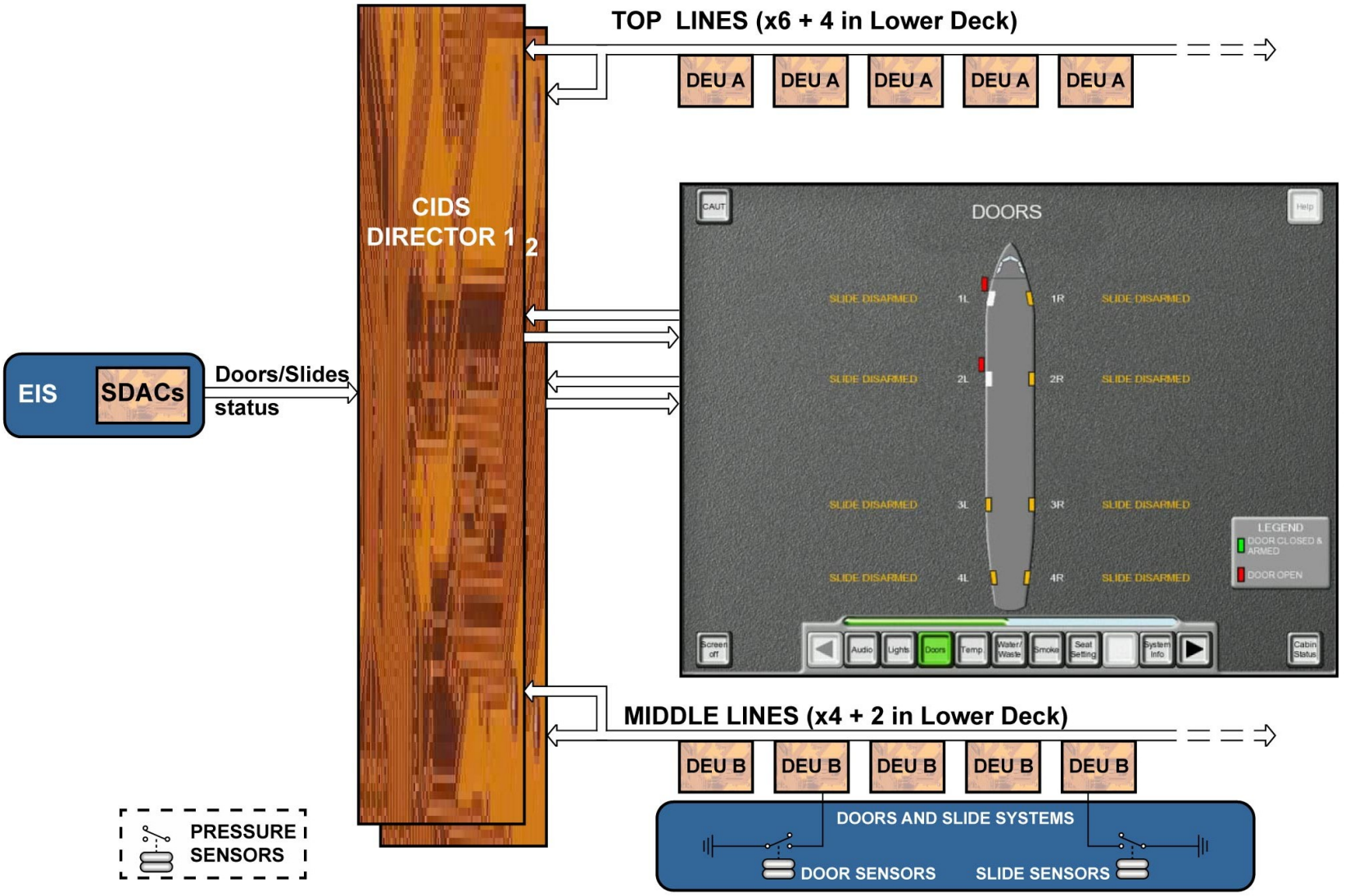

OPERATION - DOORS/SLIDES

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

AIR CONDITIONING

On the CABIN TEMPERATURE page of the FAP, the actual temperature in all cabin areas is indicated.
The temperature data is transmitted by the Environment Control System (ECS) to the Directors. The active Director sends this data to the FAP.
The cockpit selected temperature for all cabin areas is also indicated.
The CIDS has the capability to perform fine adjustment for each cabin zone. The temperature correction is limited to plus or minus 3°C from the general temperature selection in the cockpit.
If a new targeted temperature is selected the signals are sent from the FAP, via the Directors, to the ECS.
The Reset button is used to reset all areas targeted temperature to cockpit selected temperature.

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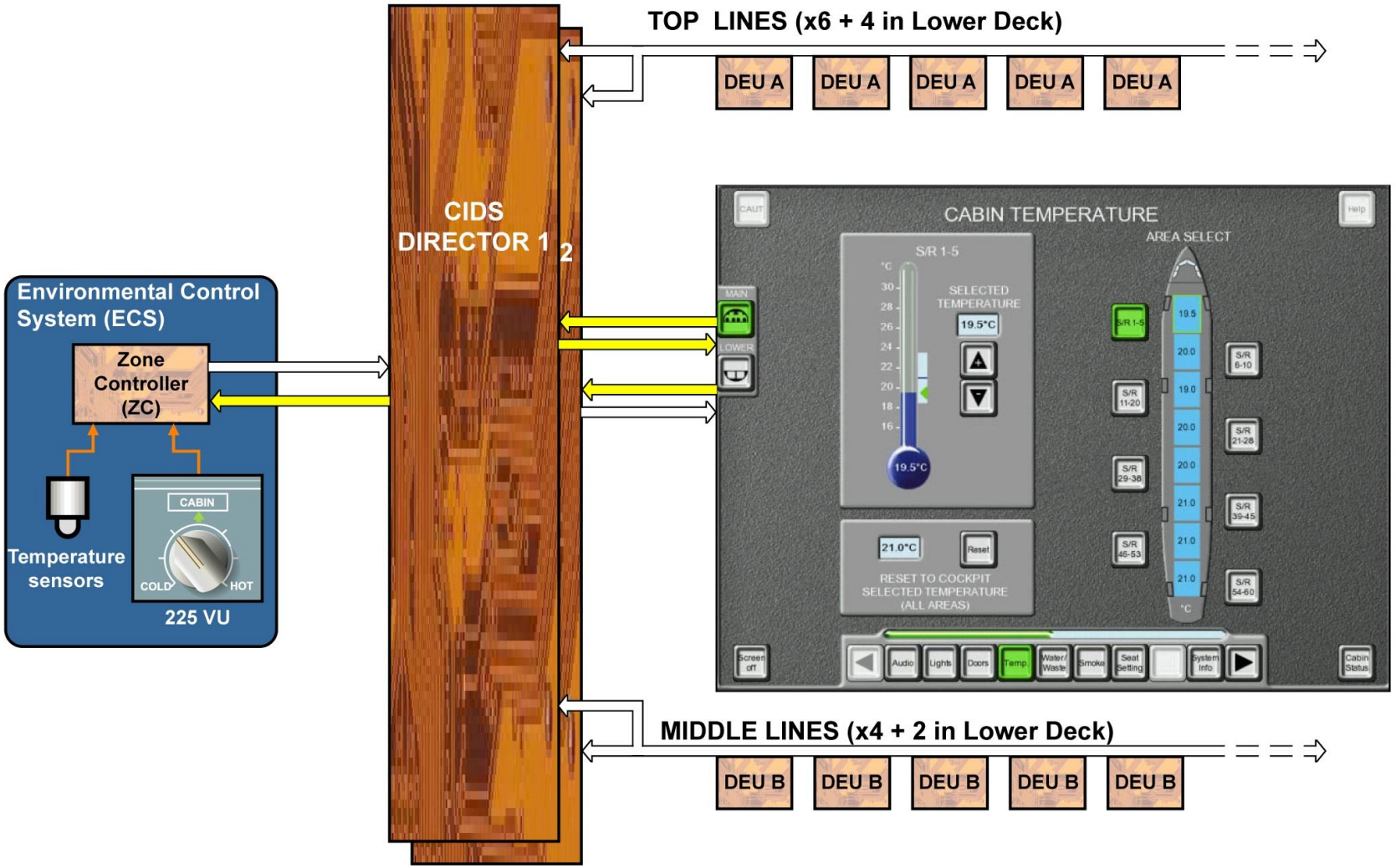

OPERATION - AIR CONDITIONING

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

WATER AND WASTE

The WATER / WASTE FAP page shows the filling level of the water tank on the FAP and gives the commands for the pre-selection of the water quantity.
The water quantity is transmitted from the Vacuum System Controller (VSC) to the Directors. The active Director sends the signal to the FAP where the actual quantity is indicated.
After pre-selection of a new filling level, the information is transmitted from the FAP to the Directors. The active Director transmits a signal to the VSC which performs the alteration.
The WATER / WASTE FAP page also shows the filling level of the waste tanks on the FAP. Additionally, the inoperative lavatories are indicated on the FAP.
The waste quantity level is transmitted from the VSC to the Directors. The active Director sends this information to the FAP, where the actual quantity is indicated.
If the VSC indicates a lavatory failure, the respective signal is sent to the Directors. The active Director transmits the signal to the FAP where a related message indicates the fault.
In case of a lavatory failure, the active Director sends signals to the type B DEUs to switch on the respective ACP light segment, and the related message is shown on the AIP.
The active Director also sends to the type A DEUs the signal to activate the chime in the cabin and the respective lavatory call light.

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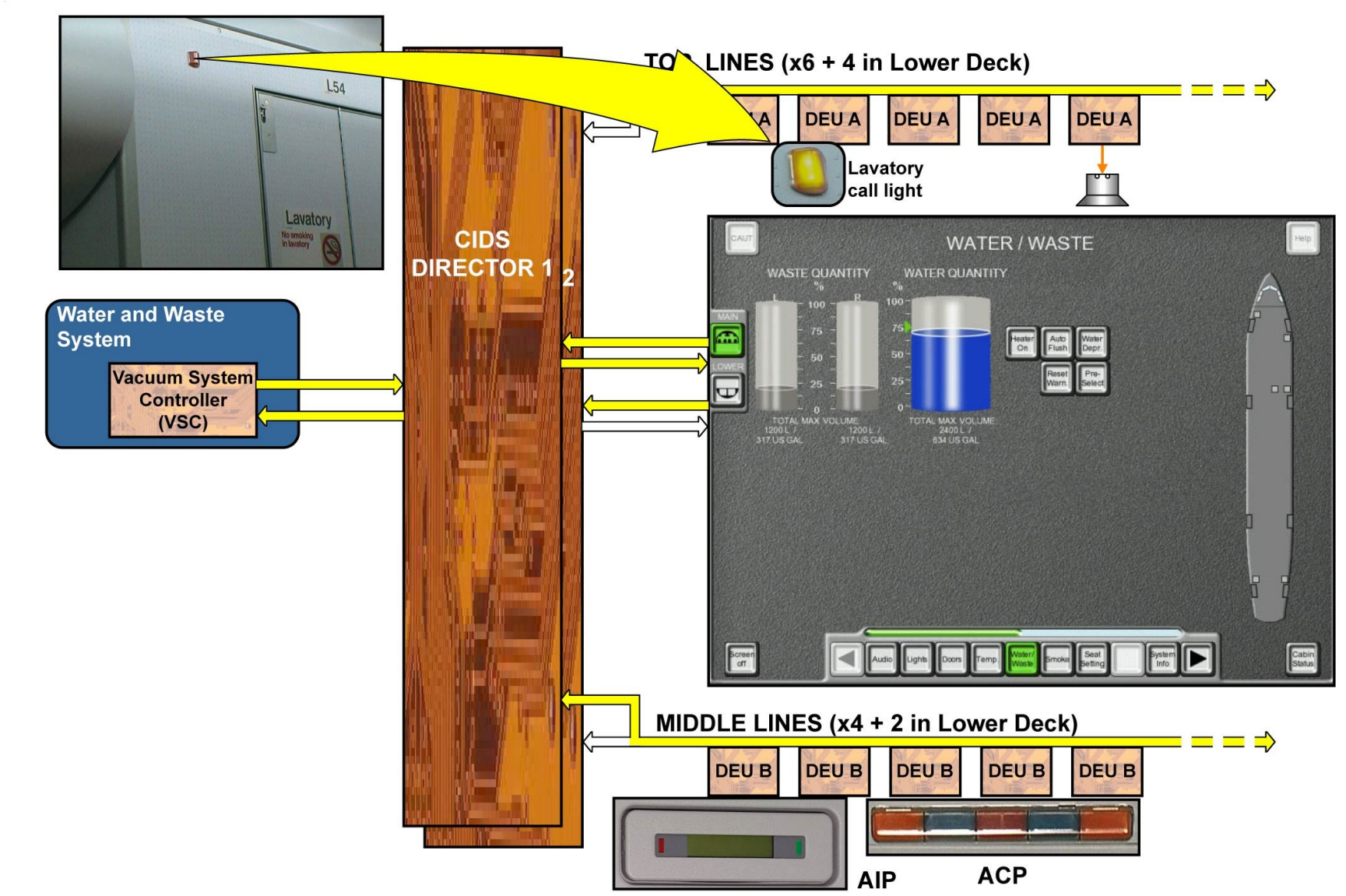

OPERATION - WATER AND WASTE

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

SMOKE DETECTION

The CIDS gives the visual and aural indications in the cabin, if a smoke alert is received from the smoke-detection system.
After smoke is detected, the Smoke Detection Control Unit (SDCU) transmits a signal to the CIDS Directors. The active Director sends a signal to the FAP where the SMOKE page comes up automatically.
The CIDS indicates smoke alerts detected in the following areas:
- lavatories,
- FCRC,
- LD-MCR,
- the Video Control Center (VCC).

On the SMOKE page, the location of the smoke alert is clearly shown.
The active Director also transmits a signal to the type A DEUs. The type A DEUs activate a chime sequence in the loudspeaker. A smoke alert from the lavatory activates the respective flashing lavatory call light.
The respective ACP light segment flashes and the related message is shown on the assigned AIP.
If smoke is no longer detected, the SDCU automatically resets all visual and aural indications.
To reset the visual and aural indication in the cabin manually you have to push the SMOKE RESET and Smoke Reset buttons either on the SMOKE page on the FAP, on the FAP hard key or on the AAP.
This affects only the cabin indications. The FAP SMOKE page and the various smoke messages remain displayed as long as the smoke condition persists.

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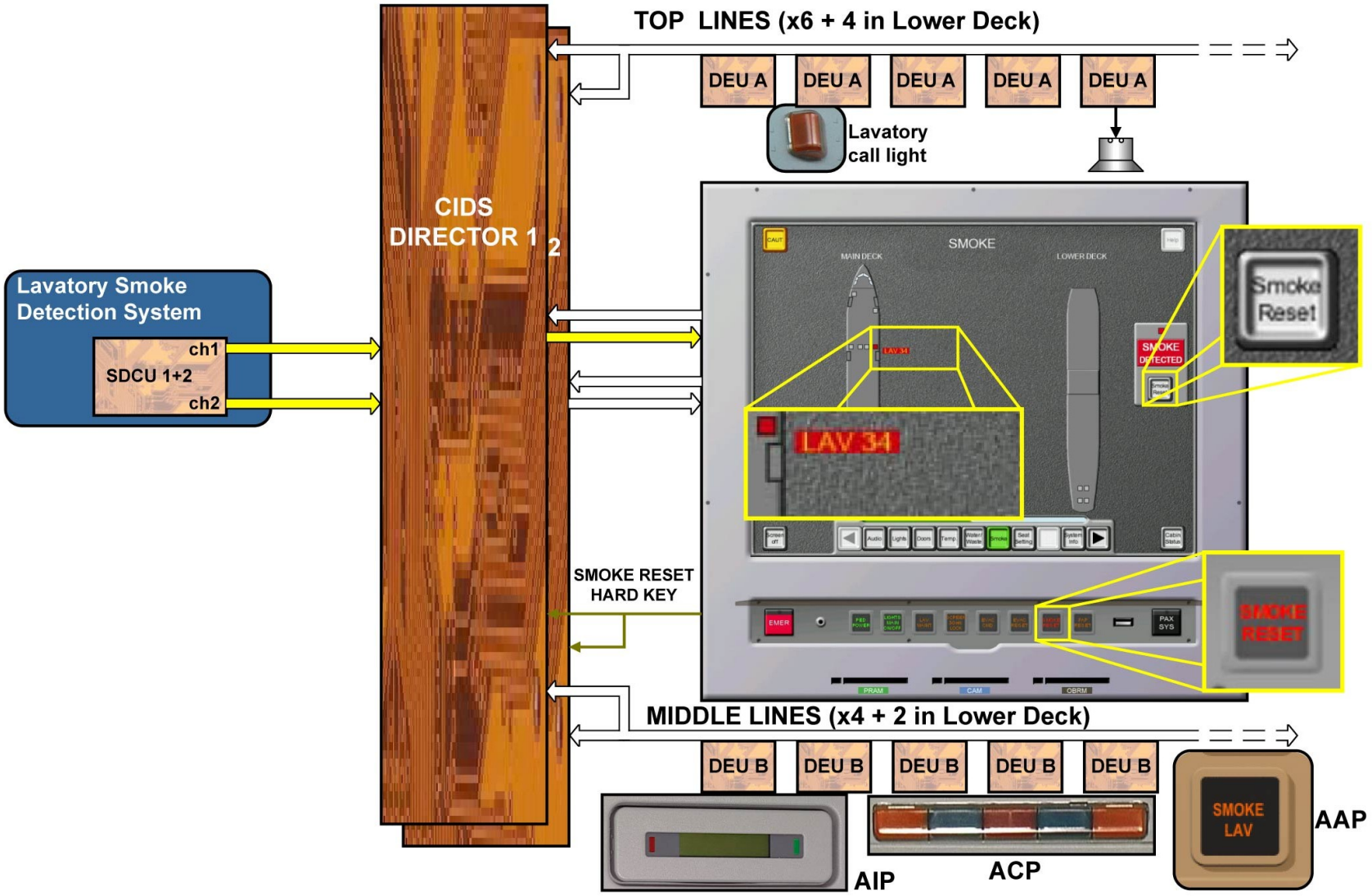

OPERATION - SMOKE DETECTION

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

EMERGENCY EVACUATION

The emergency evacuation signaling system is indicating that the evacuation process shall be started. The EMER command can be initiated from the FAP, via the EVAC CMD button, and/or from the cockpit, via the EVAC panel.

The EVAC switch is used by the cabin crew to initiate the evacuation process or not.

In the CAPT position, only the cockpit crew can activate the EVAC COMMAND. The cabin crew selecting the EVAC CMD on the FAP will then only light the EVAC indication in the cockpit.

In the cockpit, the aural indication by the horn is initiated in case of EVAC CMD initiated or asked from the FAP.

The horn can be shut off by using the HORN OFF button.

The EVAC command is confirmed (or asked) by the cockpit crew pushing the COMMAND button. The ON indication lights up in white.

Indication in the cabin is given through an emergency tone broadcast by the loudspeakers. At the same time, the AIPs will display EVACUATION ALERT and their red light will flash. The ACPs will illuminate the respective field.

The EVAC reset is done

- in the cockpit by pushing the EVAC CMD P/BSW a second time,
- in the cabin using the EVAC RESET button on the FAP or AAPs.

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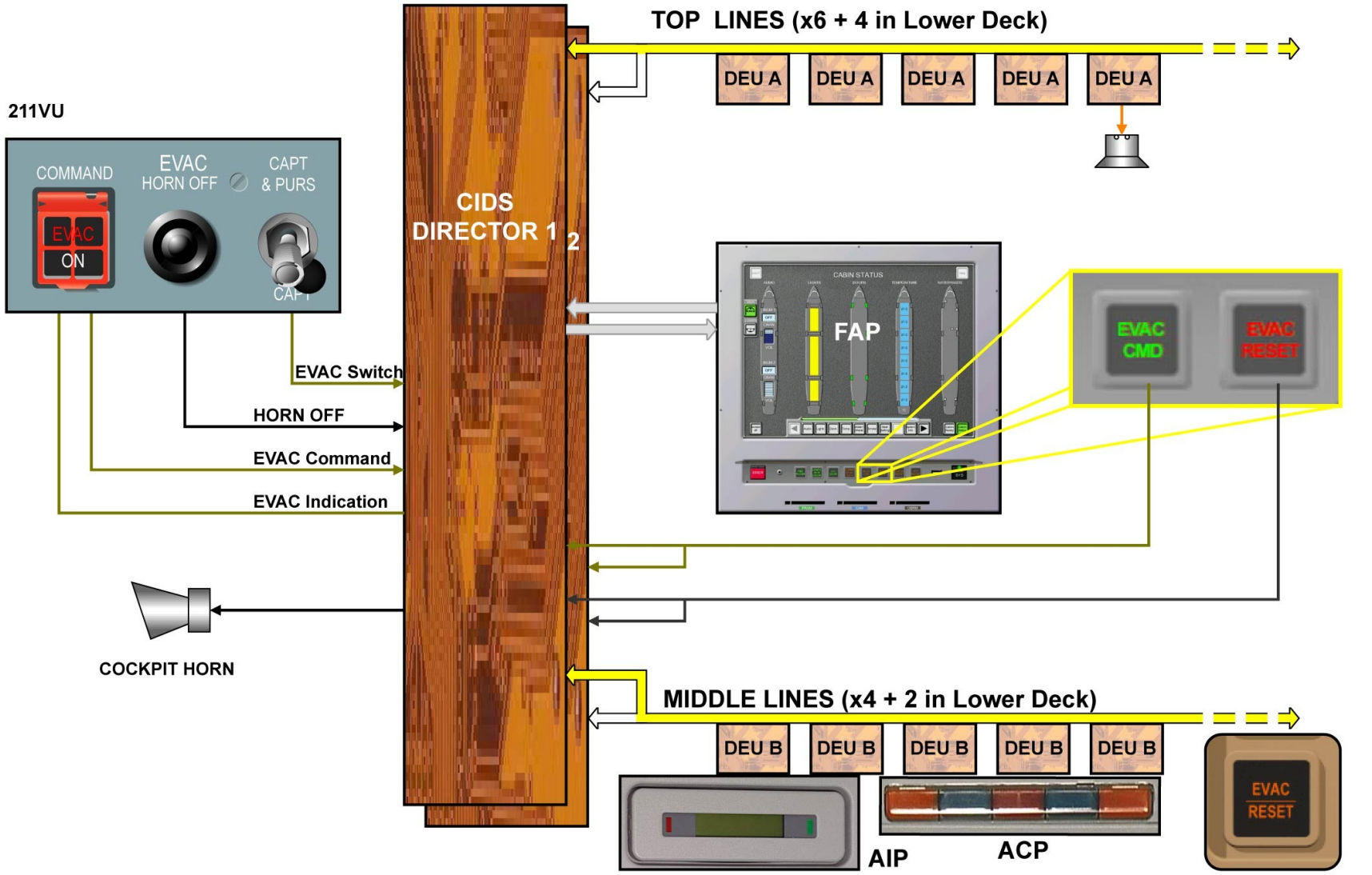

OPERATION - EMERGENCY EVACUATION

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

CABIN READY SIGNALING (OPTION)

The cabin ready signaling is used by the cabin crew to inform the cockpit crew about the cabin status. It is initiated on the FAP CABIN STATUS page. The Cabin Ready button is displayed on the lower RH corner.

The information is relayed by the Directors to the SDAC to be displayed on the ECAM EWD memo. If this function is activated, the cabin ready signaling becomes part of the landing and take-off checklist.

From Grey status, the button becomes green when it is selected. At the same time in the cockpit on the ECAM, the CABIN CHECK message becomes CABIN READY.

The enable/reset logic of the button is programmed in the CAM. It will depend on flight phases and various other conditions.

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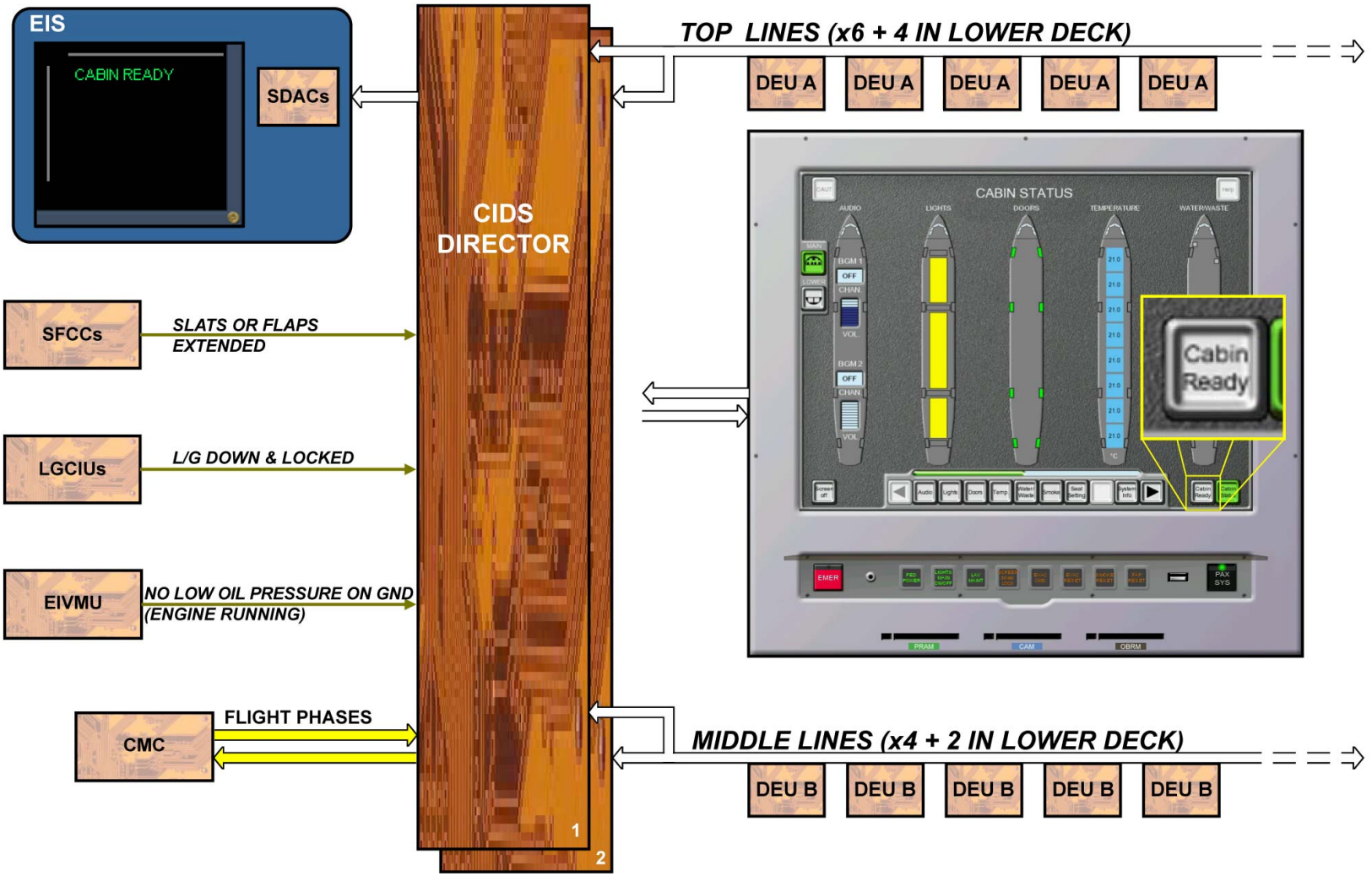

OPERATION - CABIN READY SIGNALING (OPTION)

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

OPERATION (continued)

MAINTENANCE

The CIDS is designed to continuously monitor its own performance and that of the connected equipment. Directors, FAP, DEUs, PISAs, AAPs and AIPs contain BITE circuits.
The CIDS Directors store the detected faults in the CIDS units and the connected systems and send them to the CMC.
In the event of major faults, respective information is additionally sent to the ECAM display via the SDACs.
On ground, the MCDUs are used to dialogue with the CIDS via system report/test menus. This enables system configuration, Line Replaceable Unit (LRU) identification and tests to be done.
Some of the faults and test results are also sent to the FAP to be displayed on the related page.
The CIDS provides a Multi-Purpose Bus (MPB) for onboard monitoring in case of failure of the CMC. Since the CIDS is a type 1 system, monitoring of the internal and external system status, conditions and activities can be done through the ARINC 429 bus. The bus is accessible via a test plug interface in the avionics compartment.

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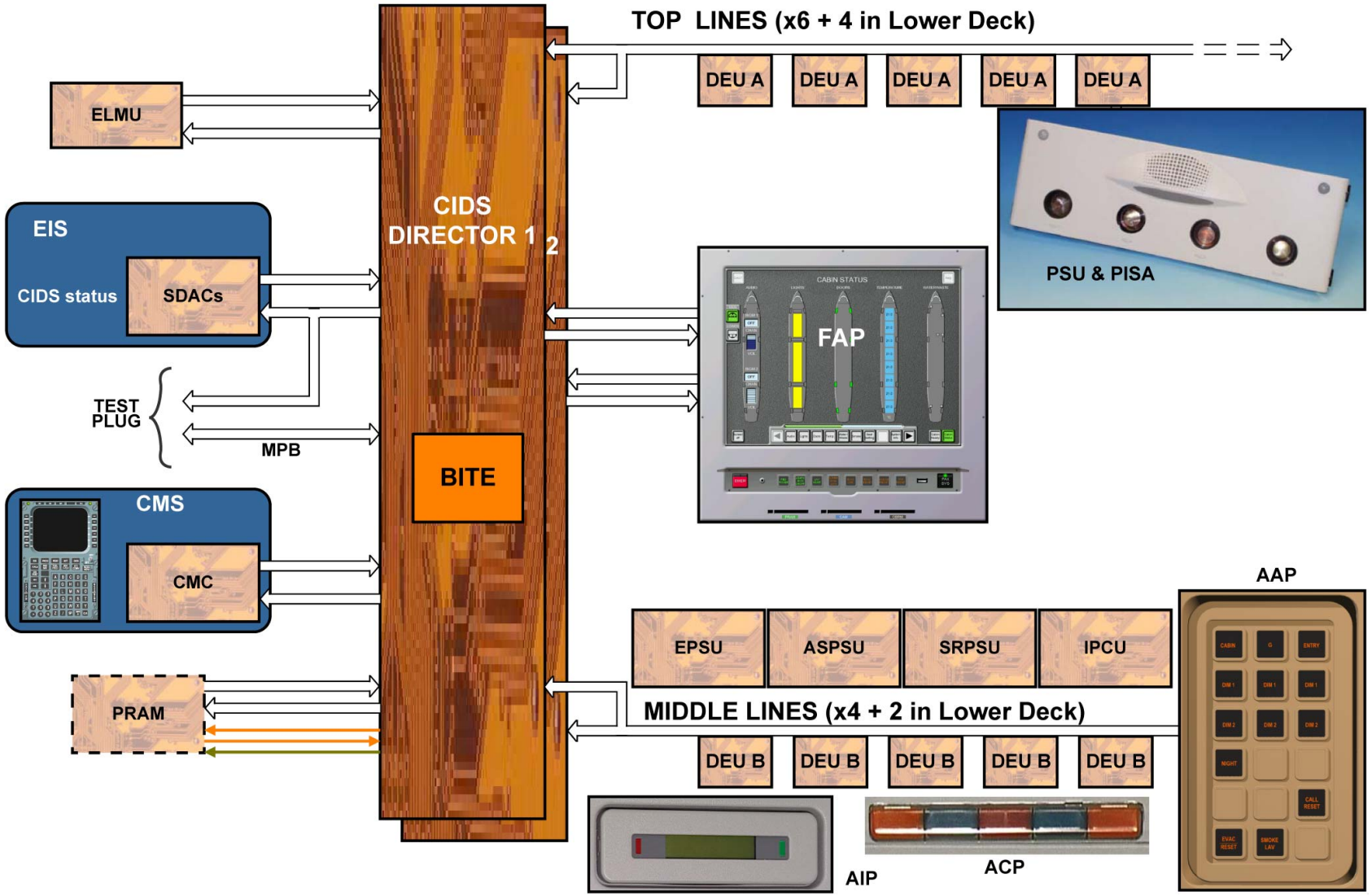

OPERATION - MAINTENANCE

CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

CIDS PROGRAMMING

The CIDS is designed to be customizable. A system reconfiguration for the installation of options, cabin reconfiguration or CIDS expansion is limited to software database changes e.g. the OBRM and the CAM.
The OBRM defines in particular the operating software of the CIDS, but also all connections to this system and emergency functions.
The CAM defines the cabin layout. According to the program, the Directors will consider the various cabin features and options validated by the CAM software and will ensure the proper operation of the CIDS. This software is in the CAM A part. The CAM also has another essential role: it is to define all messages and page layouts of the FAP screen. It is known as CAM B. The CAM has 120.000 parameters to store all those items.
During the CIDS power-up, the Directors will compare the CAM and OBRM layout with their memories. If they find a difference, OBRM and CAM data will be downloaded. In the case of a total FAP failure combined with loss of the CAM and the OBRM flash cards, the CIDS will operate in restricted operating mode (BASIC functions active), thanks to the simplified operating software and cabin layout memory stored in the Directors.
The major CIDS programming functions available on ground via the FAP are:
- layout change,
- audio level adjustment,
- FAP set-up.

NOTE: Note that the FAP pages listed below are protected from inadvertent use by a password except for the FAP SET-UP page.

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CIDS PROGRAMMING

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

CIDS PROGRAMMING (continued)

LAYOUT CHANGE

The CIDS enables the cabin zone boundaries and the no smoking zone boundaries to be relocated. The CABIN PROGRAMMING page has to be selected via the system and function keys on the bottom of the screen.

Zone boundaries are situated between two seat rows. Each cabin zone has to contain a minimum of one seat row.

The NON SMOKER A/C button is used to set the entire cabin as a no smoking area.

Without saving the new entries, the previous settings remain valid after leaving the programming panel. To save the changes, push the Save button. The layout is saved in the CAM as a modified layout.

The CAM contains up to three basic cabin layouts. These layouts are selectable on the LAYOUT SELECTION page.

Each time new settings are saved, a modified layout is created under the basic layout used before modifications. If new settings are made upon a modified layout, saving the new layout parameters will increment the modified layout count number.

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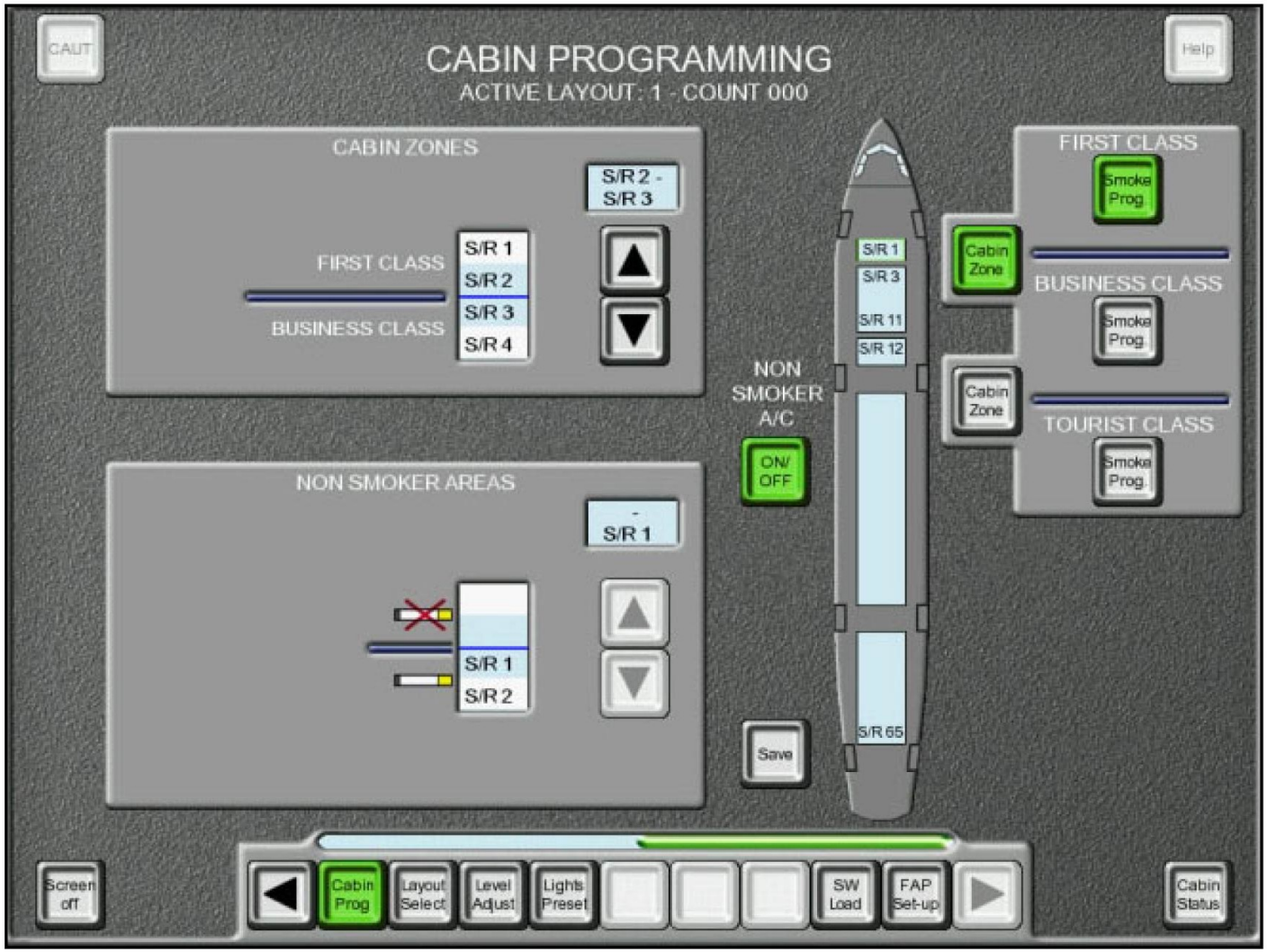

CIDS PROGRAMMING - LAYOUT CHANGE

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CIDS PROGRAMMING - LAYOUT CHANGE

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

CIDS PROGRAMMING (continued)

LEVEL ADJUSTMENT

The CIDS enables the volume of chimes and announcements to be changed in all defined cabin areas independently. To do so, the LEVEL ADJUSTMENT page has to be selected via the system and function keys on the bottom of the screen.
The area selection is made by pushing the related Adjust button. Then you can adjust announcement and chime volume in the selected area. The adjustment goes from -6 to +6 dB related to the nominal volume. The Default button resets all parameters to the CAM default values. To save the changes, push the Save button. Without saving the new entries, the previous settings remain valid after leaving the programming panel.

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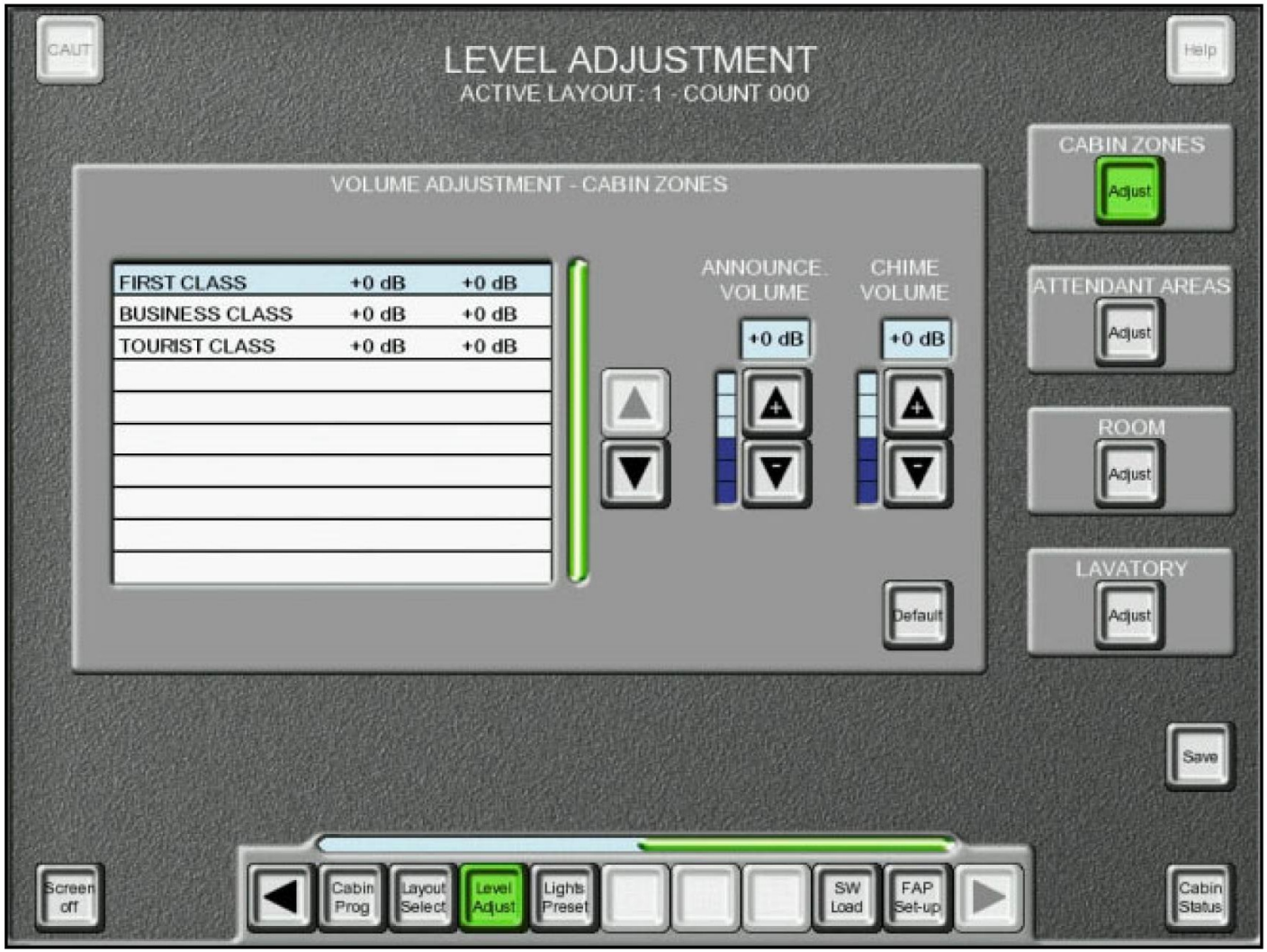

CIDS PROGRAMMING - LEVEL ADJUSTMENT

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CABIN INTERCOMMUNICATION DATA SYSTEM D/O (3)

CIDS PROGRAMMING (continued)

FAP SET-UP

The CIDS enables the brightness of the screen to be changed and the volume settings to be adjusted for the FAP internal loudspeaker and headphone. The FAP Set-Up page has to be selected via the system and function keys on the bottom of the screen.
The TOUCHSCREEN CLICK button makes the FAP emit a key click through the internal loudspeaker each time a function is selected. It becomes green when set to ON.
The Default button resets all the FAP Set-Up parameters to the CAM default values.
To save the changes, push the Save button. Without saving the new entries, the previous settings remain valid after leaving the programming panel.

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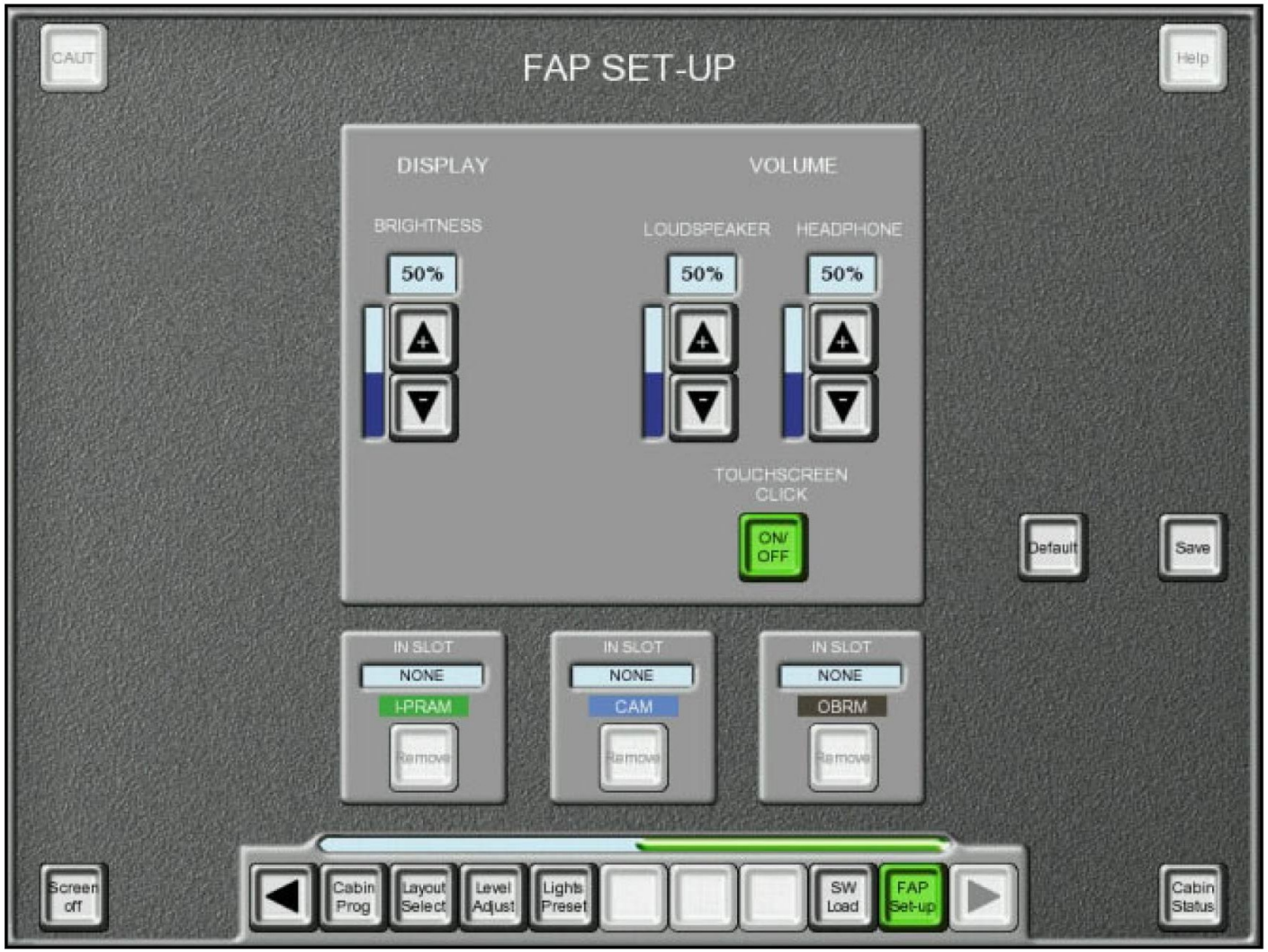

CIDS PROGRAMMING - FAP SET-UP

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EMERGENCY LOCATOR TRANSMITTER SYSTEM D/O(CEIS) (3)

GENERAL

The Emergency Locator Transmitter (ELT) function is to transmit distress signals, it can be used in automatic mode installed in the aircraft or manually when you use the ELT in portable mode. The ELT system transmits on 3 frequencies, homing-signals for civil and military, and to satellite system. The battery-pack, installed in the ELT housing, supplies the power to operate the system. The satellite system transmits distress signal to a local user terminal, when it is in range. The local user terminal receives range in a radius of approximately 2.500 Km (1367.00 NM). When the local user terminal is not in receiving range, the satellite system stores the distress signal until transmission is possible. The local user terminal automatically processes the distress signal to identify and show the position of the aircraft to a radius of approximately 1.8 Km (5900.00 ft). The processed data is transmitted to a mission control center. The mission control center sends the data to an applicable rescue coordination center, where search and rescue operations are started. The civil and military homing-signals are used to find the aircraft in the final stage of search and rescue operation.

NOTE: In technical documentation, the ELT is shown in ATA 25.

ELT DESCRIPTION

The ELT system is composed of:
- an emergency locator, installed in a support assembly which is installed above the ceiling panel in the AFT utility area, between frame FR63 and FR67,
- a programming-box assembly, which is a part of the support assembly and is connected by a short cable to the ELT,
- a remote control panel, installed on the cockpit overhead panel,
- an external antenna, linked to the ELT which is installed on the upper external fuselage between FR64 and FR65,

EMERGENCY LOCATOR TRANSMITTER

The ELT has a cylindrical orange-colored housing which includes these components:
- placards attached to the housing (Identification, expiry date and operating instructions, battery),
- an electronic assembly which is kept in the cylindrical housing and his assembly components are an activation board, which includes the G-switch, and a triple-frequency transmitter board,
- a high-powered battery-pack which is kept in the cylindrical housing, supplies the power to operate the ELT,
- an interface which includes an ANT connector to connect the whip or external antenna, a TX indicator to indicate a BITE test result or when ELT operates, an AUTO/OFF/ON switch to select desired mode, and a TC connector used to connect a remote control panel, a programming-box assembly and programming/test/reading equipment.
- a float and a whip-antenna (referred to as antenna).

PROGRAMMING-BOX ASSEMBLY

The interface on the front face of the programming-box assembly includes:
- a connector for the connection from the remote control panel,
- a connector for the connection to the TC connector on the ELT,
- a red indicator.

REMOTE CONTROL PANEL

The front panel of the remote control panel includes:
- an ARMED/ON switch, which has a switch guard to prevent inadvertent manipulation,
- an ON indicator,
- a TEST/RESET P/B.

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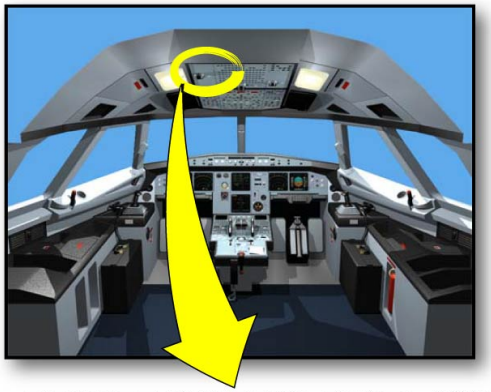
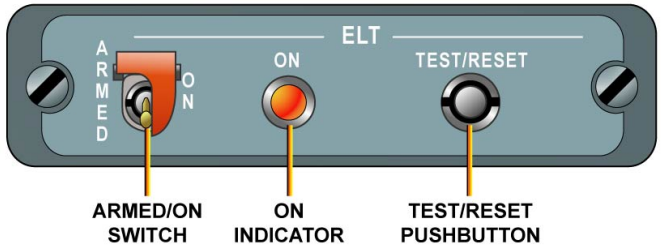
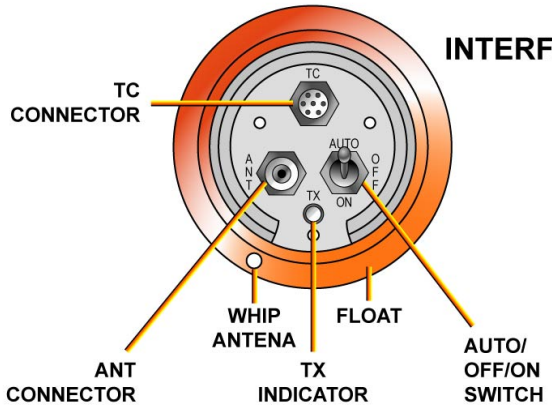
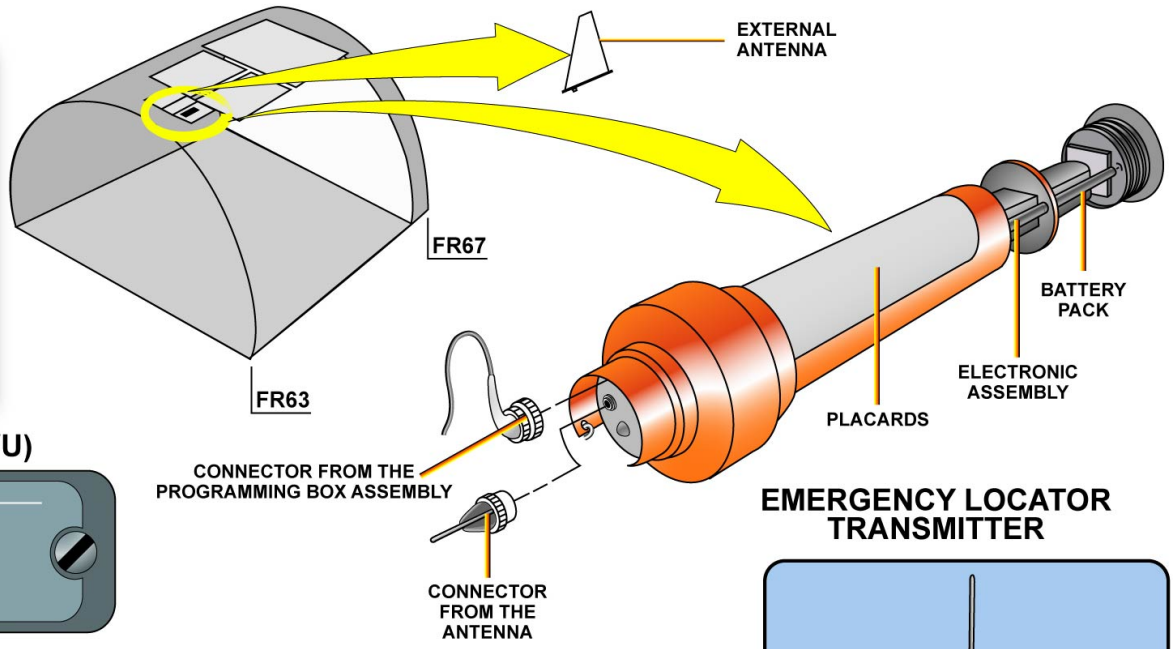


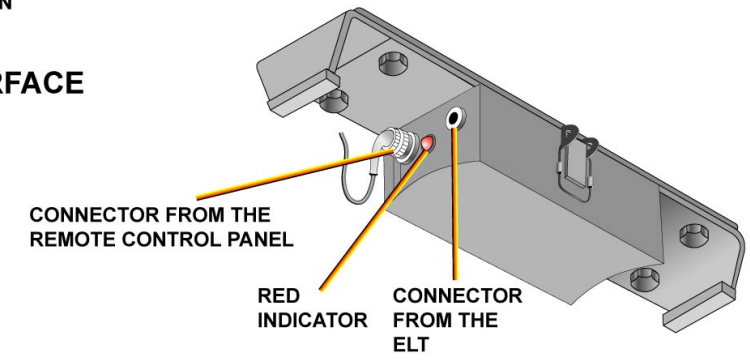
REMOTE CONTROL PANEL (20VU)



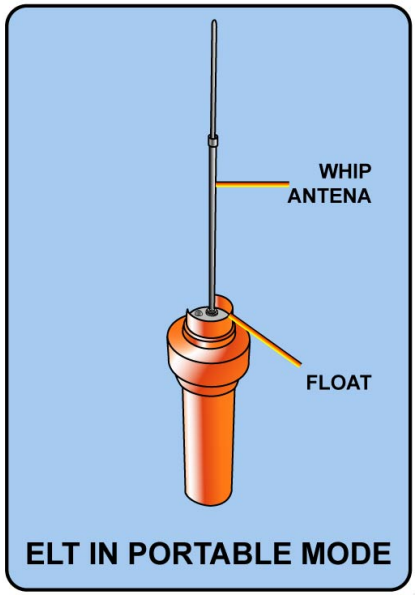




EMERGENCY LOCATOR TRANSMITTER



PROGRAMMING BOX ASSEMBLY



GENERAL & ELT DESCRIPTION

EMERGENCY LOCATOR TRANSMITTER SYSTEM D/O(CEIS) (3)

ELT OPERATION

The ELT can be operated in automatic or manual mode.

EMERGENCY LOCATOR TRANSMITTER

When you use the ELT in portable mode it is operated manually, this is done by removing the antenna and connecting it to the ANT connection on the ELT. The AUTO/OFF/ON switch located on the front face of the ELT has these functions:
- set to the AUTO position for automatic operation of the ELT. An automatic operation occurs when the ELT is connected to its system in the A/C, and the G-switch detects an impact sufficient to start transmission,
- set to the OFF position, when the ELT is connected to its system in the A/C and requires maintenance, when the ELT is disconnected from its system and removed from the A/C, or to stop transmission,
- set to the ON position for manual operation of the ELT. A manual operation occurs when the ELT is connected to its system in the A/C and the G-switch is not triggered, but a signal must be transmitted (aircraft out of operation, injured passengers/crew members), when the ELT is connected to its system in the A/C and you do a self-test (BITE), or when the ELT is disconnected from its system, removed from the A/C and used in portable mode.

An accidental operation occurs when the ELT is connected to its system in the A/C, and the G-switch starts transmission without a real emergency (hard landing).

PROGRAMMING-BOX ASSEMBLY

The programming-box assembly automatically transfers data (information and identification of the A/C) to the ELT, when the programming-box assembly is connected to the TC connector. After the data transfer occurs, the programming-box assembly verifies the validity of the data transferred. When all programming and verification is completed the programming-box assembly goes automatically into standby mode. The programming-box assembly is not operated when the ELT is started from the remote control panel, and has no effect on the signals between the remote control panel and the ELT. If the programming-box assembly becomes defective the connector from the remote control panel can be connected directly to the TC connector. You can stop ELT transmission when you disconnect the programming-box assembly connector from the TC connector, the AUTO/OFF/ON switch must be set to the OFF position. The programming-box assembly has a red indicator, which comes on to indicate the BITE test result.

REMOTE CONTROL PANEL

The remote control panel controls and indication are as follows: The ARMED/ON switch is set to the ARMED position for automatic operation of the ELT. The switch is kept in the ARMED position by a switch guard which stops accidental operation of the ELT. The ARMED/ON switch is set to the ON position for manual operation of the ELT. You must lift the switch guard to set the ARMED/ON switch to the ON position. Pressing the TEST/RESET pushbutton starts a BITE test of the ELT, pressing again stops the operation of the ELT, and returns the ELT to its AUTO mode after a complete BITE test sequence. The ON indicator comes on when the ELT operates, or to indicate the BITE test result. When the ELT operates the ON indicator flashes one time, then comes on continuously for 100 seconds. After 100 seconds it flashes continuously (on for 1 second - off for 1.5 seconds).

BITE TEST

This BITE test action can be done by means of the ELT or the remote control panel on the front face of the ELT, the BITE test is done by, setting the ON/OFF/AUTO switch to the AUTO position and to connect

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the programming-box assembly to the TC connector, or on the remote control panel, by pushing the TEST/RESET P/BSW, these actions occur:
- the red indicator comes on, on the programming-box assembly,
- the TX indicator and the buzzer operate, on the ELT,
- the ON indicator flash then comes on, on the remote control panel,
- the ELT indicator flashes then comes on, on the external power panel,
- the mechanic call-horn operates, in the nose-landing-gear well.

NOTE: Do not do an annunciator light test during the test of the ELT system. If you do, you can cause damage to an internal relay of the ELT.
Do not do the ELT test for longer than 150 seconds. If you do, the ELT will send distress signals and rescue operations will start.

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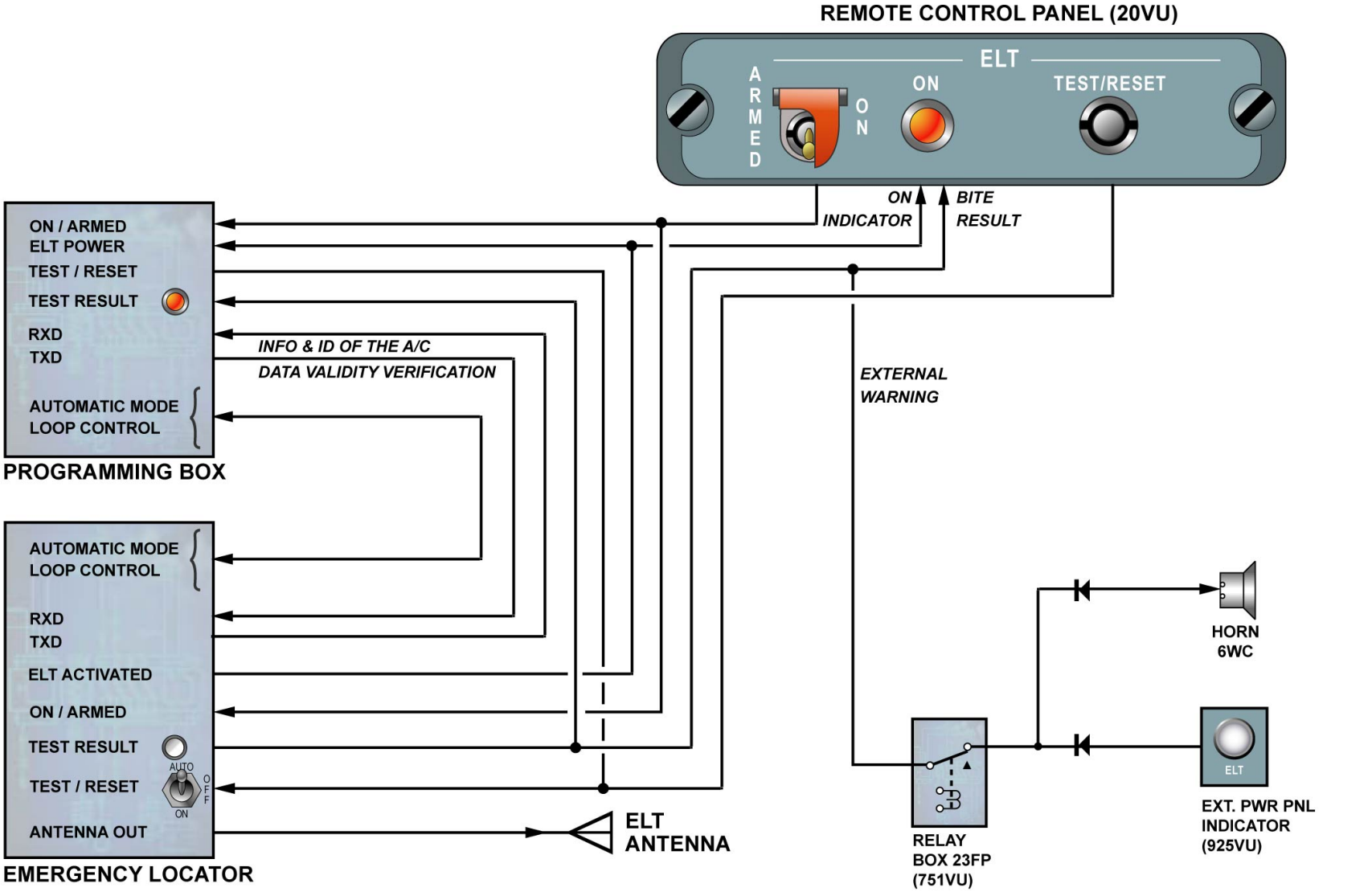

ELT OPERATION & BITE TEST

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EMERGENCY LOCATOR TRANSMITTER SYSTEM D/O(ELTA) (3)

GENERAL

The Emergency Locator Transmitter (ELT) function is to transmit distress signals. It can be used in automatic mode installed on board the aircraft or manually when you use the ELT in portable mode. The ELT system transmits on 3 frequencies homing-signals for civil and military, and to satellite system. The battery-pack, installed in the ELT housing, supplies the power to operate the system. The satellite system transmits distress signal to a local user terminal, when it is in range. The local user terminal receives within a radius range of approximately 2.500 Km (1367 NM). When the local user terminal is not within the receiving range, the satellite system stores the distress signal until transmission is possible. The local user terminal automatically processes the distress signal to identify and show the position of the aircraft within a radius of approximately 1.8 Km (5900 ft). The processed data is transmitted to a mission control center. The mission control center sends the data to an applicable rescue coordination center, where search and rescue operations are started. The civil and military homing-signals are used to find the aircraft in the final stage of search and rescue operation.

NOTE: In technical documentation, the ELT is shown in ATA 25.

ELT DESCRIPTION

The ELT system is composed of:
- An emergency locator, installed in a bracket, held in position with two buckles and straps, with the interface in flight direction. The bracket is installed above a ceiling panel in the AFT utility area, between FRame 63 and FR67,
- An optional remote control panel, installed on the cockpit overhead panel,
- A ware harness is installed between the ELT and the Remote Control Unit (RCP),
- An external antenna, linked to the ELT which is installed on the upper external fuselage between FR66 and FR68,
- A mounting bracket.

EMERGENCY LOCATOR TRANSMITTER

The ELT has an orange aluminum with two covers, including these following components:
- Placards attached to the housing (Identification, strap, instruction, type and battery),
- An electronic board,
- An interface,
- A not rechargeable battery pack (voltage 6v,capacity: 10.5 A/h)

The electronic board is installed in the front half (flight direction), and the battery-pack is installed in the rear half. The interface, on the front face of the housing includes:
- A remote control panel connector, to connect the remote control panel, programming and test equipment, an adapter cable and programming-dongle connector, and a maintenance-dongle, which has a maintenance identification data code programmed in its memory,
- Back up ANT and External ANT connectors to connect the antennae,
- A red indicator, to indicate a BITE test result or when ELT operates (TX LED),
- An ON/ARMED switch, to select desired mode.

REMOTE CONTROL PANEL (OPTIONAL)

The optional Remote Control Unit is installed on the cockpit overhead-panel.
The front panel of the remote control panel includes:
- An ARMED/OFF-SWITCH,
- TEST/RESET switch.
- An ON/TEST indicator.

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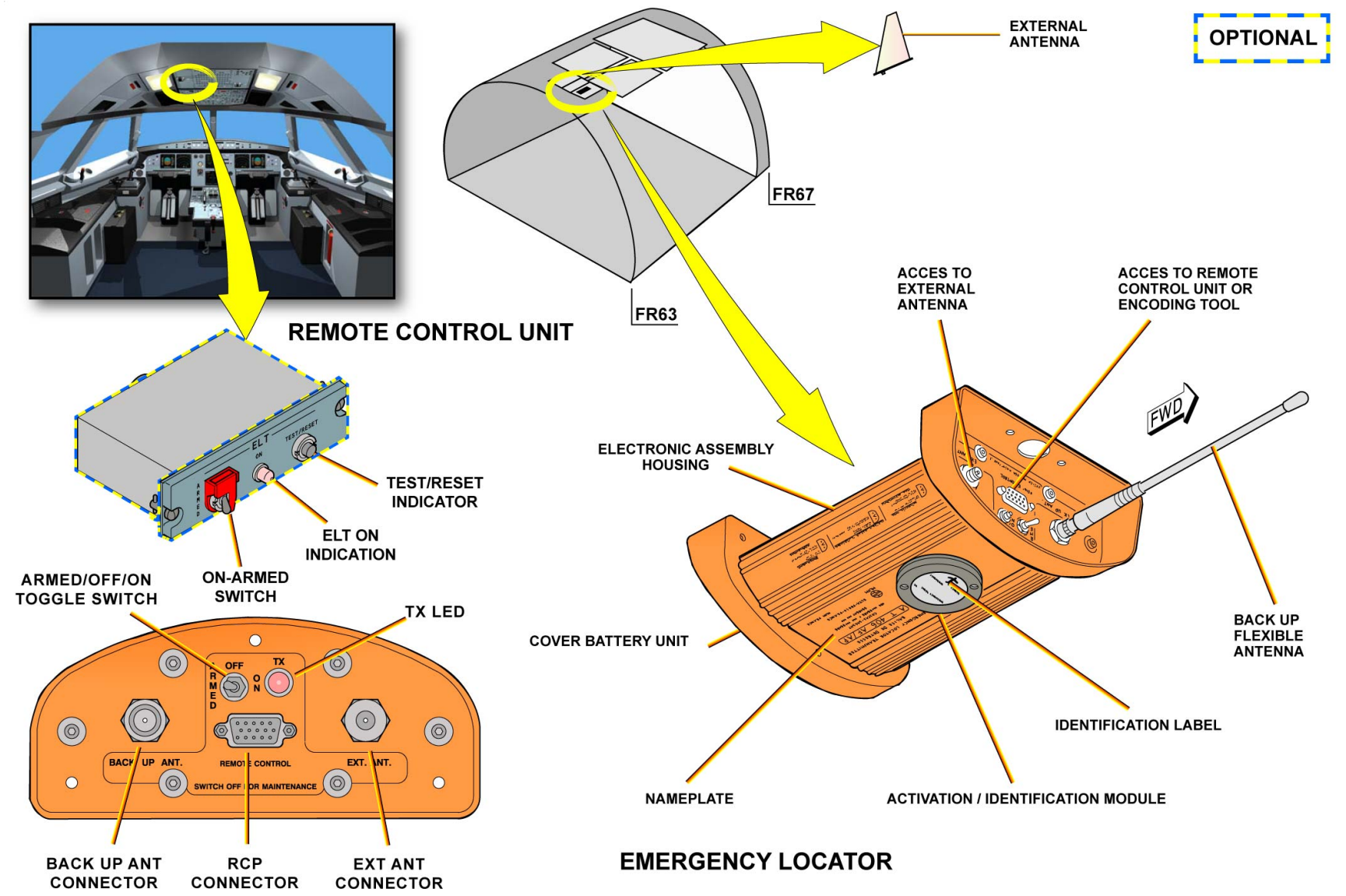

GENERAL & ELT DESCRIPTION

EMERGENCY LOCATOR TRANSMITTER SYSTEM D/O(ELTA) (3)

ELT OPERATION

EMERGENCY LOCATOR TRANSMITTER

The ELT can be operated in automatic or manual mode. When you use the ELT in portable mode it is operated manually, this is done by removing the antenna and connects it to the ANT connection on the ELT. The ON/OFF/ARM switch, located on the front face of the ELT has three functions:
- the ARM position for automatic operation of the ELT. An automatic operation is triggered when the ELT is connected to its system in the A/C, and the G-switch detects an impact sufficient to start the transmission,
- the OFF position, when the ELT is connected to its system in the A/C and requires maintenance, and when the ELT is disconnected from its system and removed from the A/C, or to stop the transmission,
- set to the ON position for manual operation of the ELT. A manual operation occurs when the ELT is connected to its system in the A/C and the G-switch is not triggered, but a signal must be transmitted (aircraft out of operation, injured passengers/crew members), when the ELT is connected to its system in the A/C and you do a self-test (BITE). An accidental operation occurs when the ELT is connected to its system in the A/C, and the G-switch can automatically starts transmission without a real emergency (ie hard landing).

REMOTE CONTROL PANEL (OPTIONAL)

The optional remote control panel controls and indication are as follows:
The ON-ARMED switch with switch guard is set to the ARMED position for automatic operation of the ELT. The switch is kept in the ARMED position by a stop, which is part of the switch assembly. The ON-ARMED switch is set to the ON position for manual operation of the ELT. You must pull the switch to clear the stop, and then set it to the ON position. The TEST/RESET push button is set to the TEST/RESET position to stop accidental operation, or to do a BITE test. The ON/TEST indicator comes on when the ELT operates, or to indicate the BITE test result. When the ELT operates the ON/TEST indicator:
- flashes two times per second during military and civil transmission,
- and, one long flash during satellite transmission.

BITE TEST

This BITE test can be done by means of the ELT or the remote control panel. On the front face of the ELT, the BITE test is done by setting the ON/OFF/ARM switch to the ARM position, or on the remote control panel, by setting the TEST/RESET P/B to TEST/RESET position, then the following actions occur:
- the red indicator flashes one time, then comes on, and the buzzer operates, on the ELT,
- the ON/TEST indicator flashes one time, then comes on, on the remote control panel (Option),
- the ELT indicator comes on, on the external power panel (Option),,
- the mechanic call-horn operates in the nose-landing-gear well (Option),.

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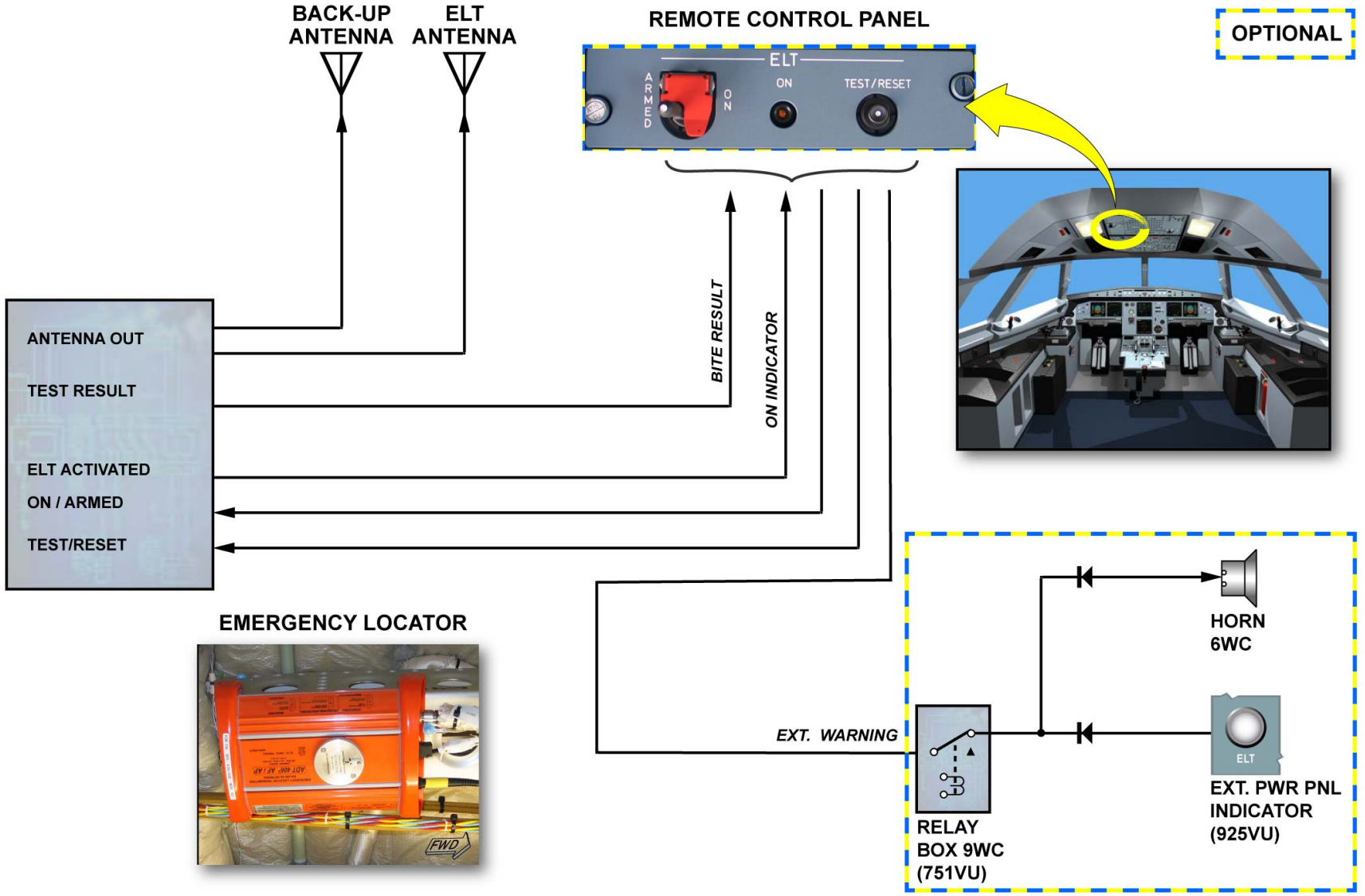

ELT OPERATION & BITE TEST

IFE SYSTEM GENERAL DESCRIPTION (3)

IN-FLIGHT ENTERTAINMENT

The main system controller, which is the core unit of the system and acts as the major interface between other head equipment items and the cabin network.
The purser control, located in the Video Control Center (VCC), which is the only human machine interface, to control and monitor the operation of the entire In-Flight Entertainment (IFE) system. A second purser control can be installed in the aft galley area: It has the same functions as the one in the VCC.
The broadcast audio/video units, which are used mainly for Passenger Address (PA) issues, as well as for safety demonstrations through video display. These units can be used as a backup in the case of major IFE software failure.
The IFE computers, which are used for data source and storage of the audio and video on demand, storage of the IFE operating software and BITE.
The cabin network is dependant to the A/C cabin definition. This network is used to direct requests from passengers to the IFE system head-end computers, and to relay data to be routed to the passenger environment.
The CIDS is connected to the IFE system via the DIRECTORS and the main system controller.

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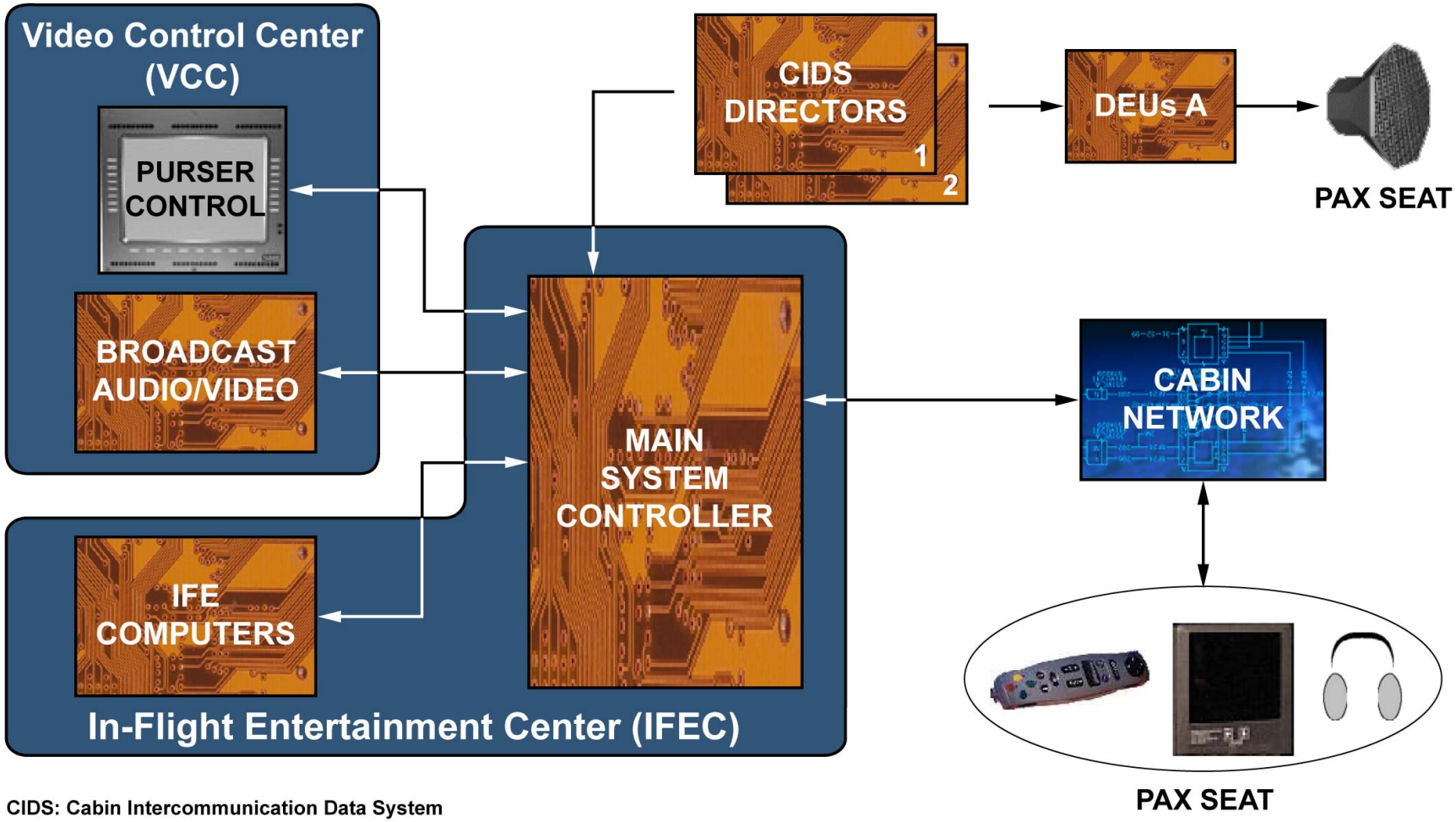

CIDS: Cabin Intercommunication Data System
DEU: Decoder/Encoder Unit
IFE: In-Flight Entertainment

IN-FLIGHT ENTERTAINMENT

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IFE SYSTEM GENERAL DESCRIPTION (3)

CIDS DIRECTORS

The CIDS directors are connected to IFE system via the main system controller. The main reasons are:
-During passenger announcement from the cabin or the cockpit, the main system controller will ensure proper audio transmission to each seat (headset).
-For audio or video broadcasts which originate from the VCC (i.e. safety demonstration video) or the In-Flight Entertainment Center (IFEC) (i.e. boarding music): the main system controller relays the message to the Cabin Intercommunication Data System (CIDS) for audio broadcast through the loudspeakers in the entire cabin or a specific cabin zone.
-During the use of controls at the seat level, individual passenger services orders will be relayed to the CIDS for appropriate action (i.e. attendant call, reading light activation).
Various A/C systems are connected to the main system controller to ensure operation in normal and abnormal situations (i.e. Landing Gear Control and Interface Unit (LGCIU) for ground or flight operating mode).

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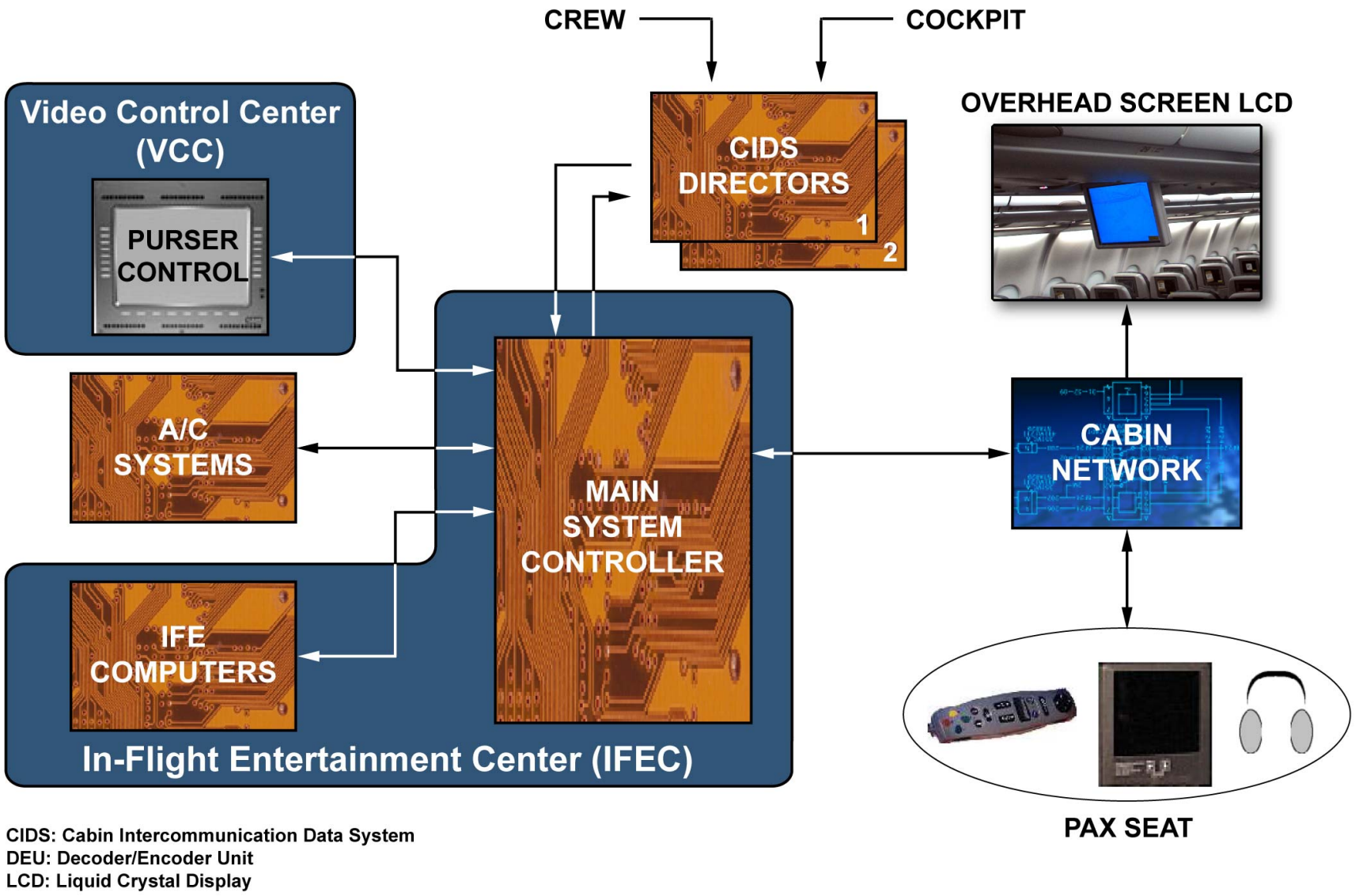

CIDS DIRECTORS

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IFE SYSTEM GENERAL DESCRIPTION (3)

PATS

The Passenger Air to ground Telephone System (PATS) is connected to the IFE system. It mainly exchanges voice and data with the main system controller and the SATCOM system. When air to ground communication is initialized, the main system controller ensures correct data exchange between the passenger seat (cabin network side) and the PATS.
The Cabin Telecommunication Unit (CTU) guarantees a correct formatting and data transmission/ reception package, as well as seamless voice communication. To achieve this transmission, only the SATCOM system is used. When data is transmitted from an A/C operating center, it is routed by the CTU to a printer, usually located in the VCC. The CTU has 30 channels fitted with a modem. It can process 29 simultaneous cabin communications (passenger side voice and/or data and one fax line from the telefax installed in the VCC).

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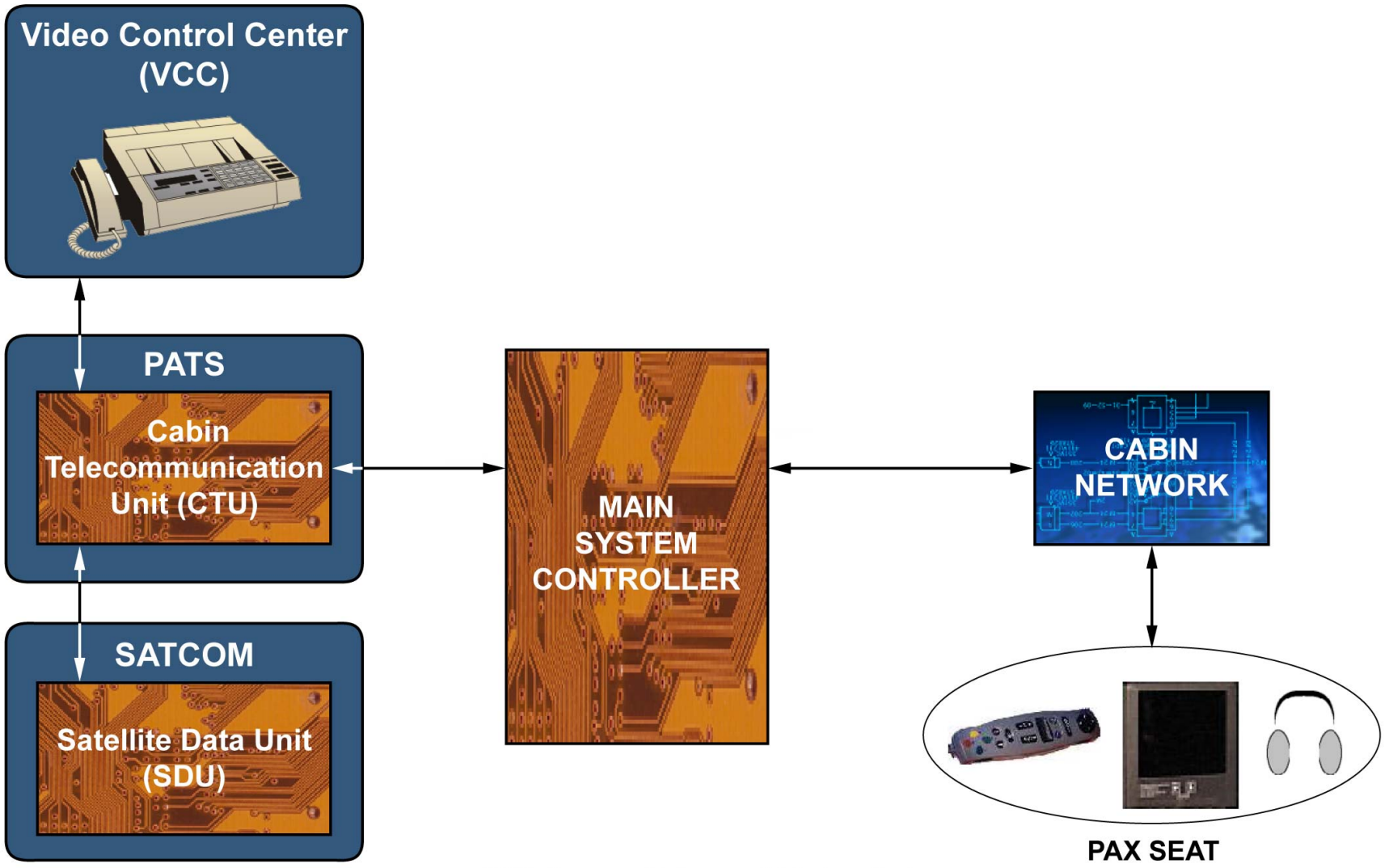
Video Control Center (VCC)
PATS
Cabin Telecommunication Unit (CTU)
SATCOM
Satellite Data Unit (SDU)
MAIN SYSTEM CONTROLLER
CABIN NETWORK
PAX SEAT
PATS: Passenger Air-to-ground Telephone System
SATCOM: Satellite Communication

PATS

IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

INTRODUCTION

The In-Flight Entertainment (IFE) system is an interactive, fully integrated passenger entertainment system. The IFE system offers the passengers the following services:
- "Classic" audio and video broadcast programs,
- safety and information announcements in conjunction with the Passenger Address (PA) system,
- interactive utilities such as video games, internet features, and more,
- Audio and Video On Demand (AVOD),
- reading and attendant call lights control in conjunction with the Passenger Service System (PSS),
- updated flight and destination information displays in conjunction with the Passenger Flight Information System (PFIS),
- video images of the NLG and MLG in conjunction with the Taxiing Aid Camera System (TACS) and the landscape camera,
- telephone capability in conjunction with the Passenger Air-to-ground Telephone System (PATS).

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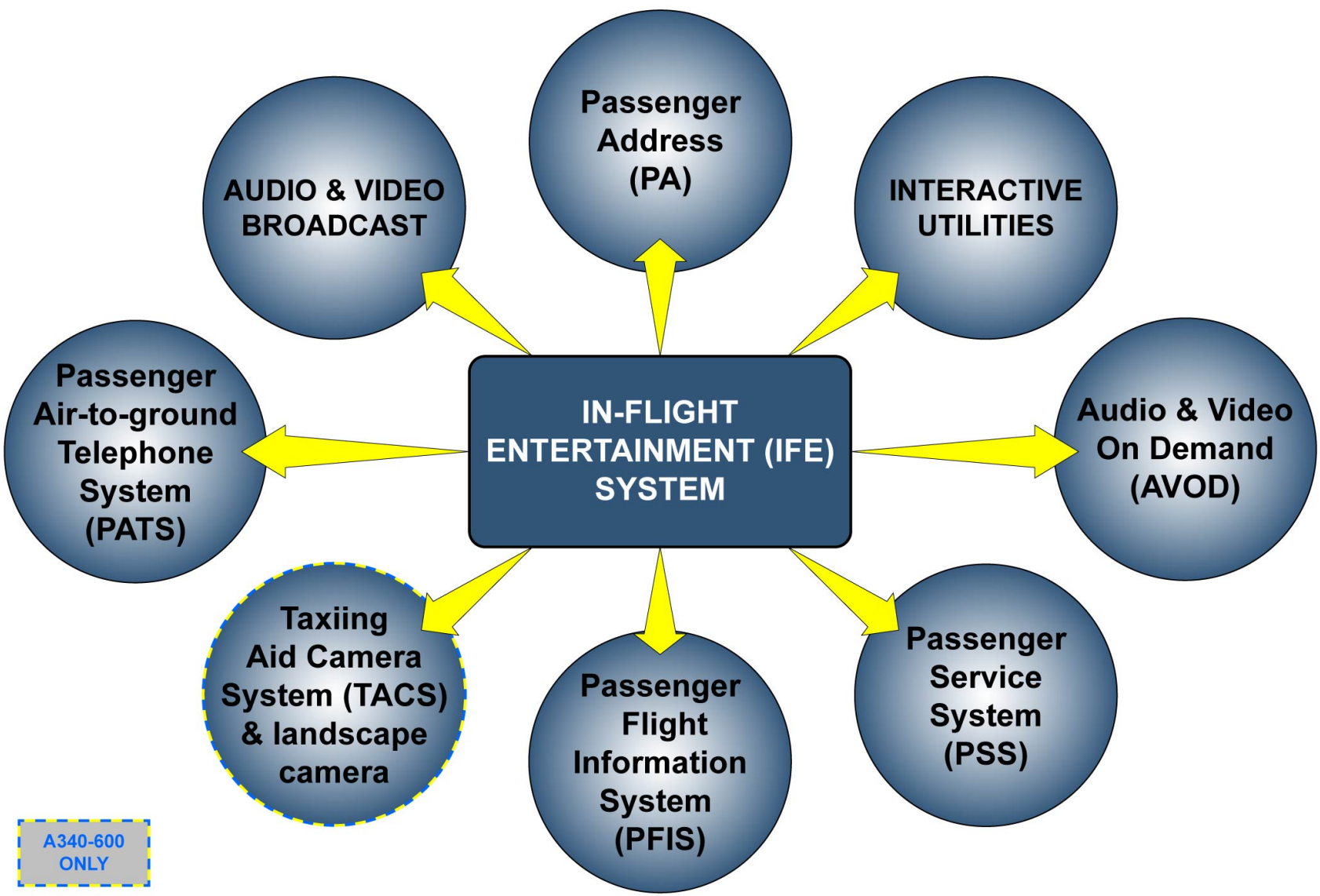
AUDIO & VIDEO BROADCAST
Passenger Address (PA)
INTERACTIVE UTILITIES
Passenger Air-to-ground Telephone System (PATS)
IN-FLIGHT ENTERTAINMENT (IFE) SYSTEM
Audio & Video On Demand (AVOD)
Taxiing Aid Camera System (TACS) & landscape camera
Passenger Flight Information System (PFIS)
Passenger Service System (PSS)
A340-600 ONLY

INTRODUCTION

IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

GENERAL

The IFE system has three main parts:
- the In-Flight Entertainment Center (IFEC) installed in the avionics bay,
- the Video Control Center (VCC) installed in the cabin,
- the distribution network also installed in the cabin.

The IFEC integrates a limited quantity of IFE Line Replaceable Units (LRUs). Most of the computers are installed in the avionics compartment, in dedicated racks. The core of the IFEC is the Enhanced Passenger Entertainment System Controller (EPESC). The EPESC is the major interface between the IFE components. It also interfaces with all other A/C systems needed for IFE services. It is connected to the Central Maintenance Computer (CMC) for IFE BITE analysis, fault monitoring and troubleshooting functions.

The Cabin Management Terminal (CMT), installed on the VCC, is the IFE Human-Machine Interface (HMI) system. The IFE system configuration and control are done with the purser control of the CMT.

The distribution network sends data to the overhead or wall-mounted displays. The viewing zones can be independent. The selection of monitors of A/C viewing zone is programmable from the purser control. The distribution network makes sure that the data is delivered to the in-seat equipment.

Each passenger has a headset and an individual video screen. Passengers interact with the IFE system using the Passenger Control Unit (PCU) or the tactile video screen.

The PCU is not only a simple remote control for IFE selection. It also controls the reading lights and the attendant call lights. The Cabin Intercommunication Data System (CIDS) DIRectors (DIRs) ensure the function called Passenger Services System (PSS). The IFE system only sends the PCU order, via the EPESC, to the CIDS. The PCU also integrates a credit card reader, a dedicated keyboard, a microphone and a loudspeaker for PATS capability.

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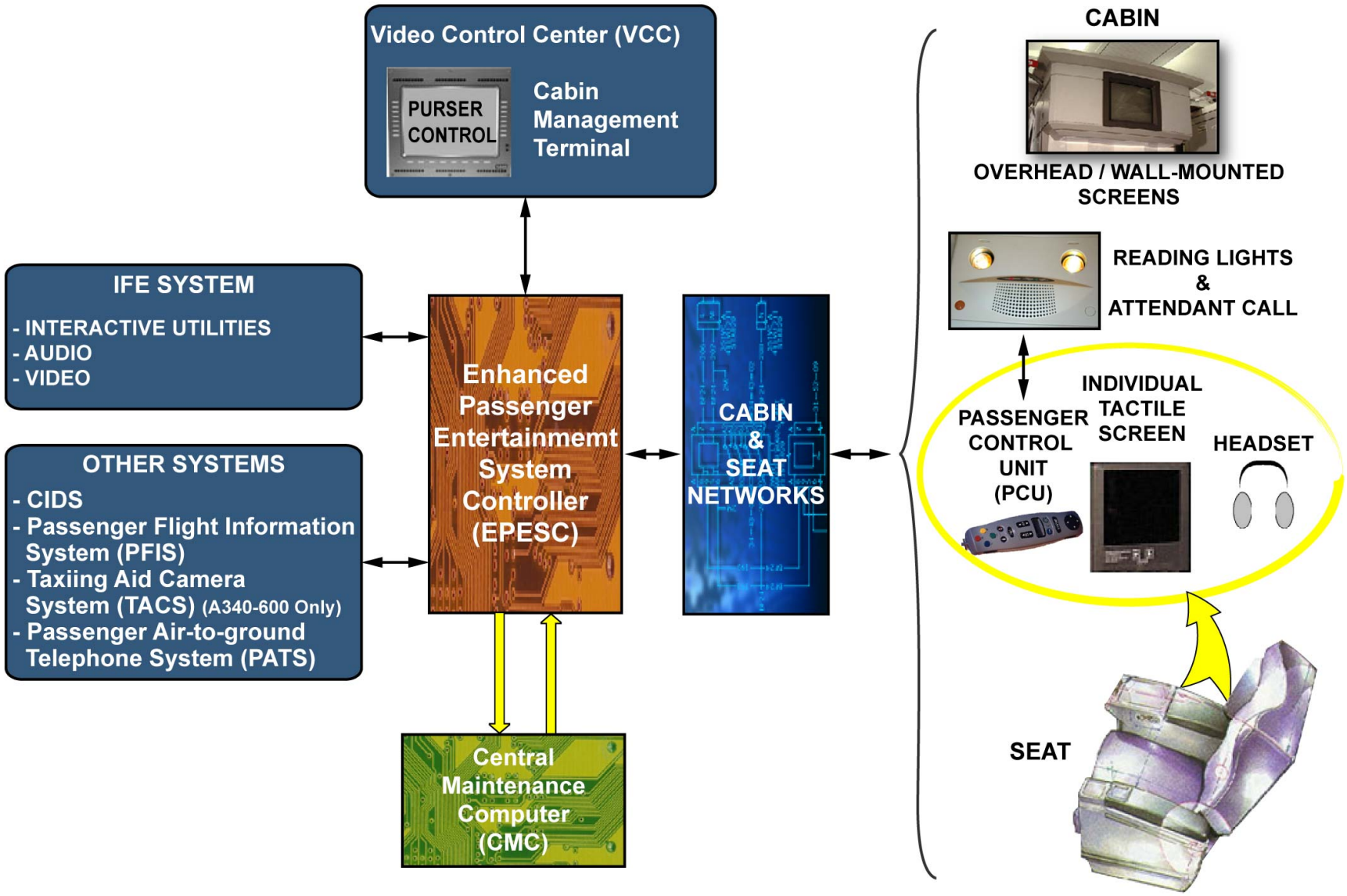
Video Control Center (VCC)
PURSER CONTROL
Cabin Management Terminal
IFE SYSTEM
- INTERACTIVE UTILITIES
- AUDIO
- VIDEO
OTHER SYSTEMS
- CIDS
- Passenger Flight Information System (PFIS)
- Taxiing Aid Camera System (TACS) (A340-600 Only)
- Passenger Air-to-ground Telephone System (PATS)
Enhanced Passenger Entertainmemt System Controller (EPESC)
CABIN & SEAT NETWORKS
Central Maintenance Computer (CMC)
CABIN
OVERHEAD / WALL-MOUNTED SCREENS
READING LIGHTS & ATTENDANT CALL
PASSENGER CONTROL UNIT (PCU)
INDIVIDUAL TACTILE SCREEN
HEADSET
SEAT

GENERAL

IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

OVERVIEW

The IFE system is a complex system, which is capable of many functions through many components. This is achieved through an internal communication network that links the IFE system LRUs. This network is a Local Area Network (LAN) called a "token ring". A specific component, a LAN hub, is required for the management of the token ring LANs. The LAN hub unit regulates the speed of the token and monitors its behavior within the ring.
The token ring mainly supplies the system with control data (orders). Orders either come from the VCC (e.g. IFE system setup) or from the passenger seats (e.g. AVOD). Requested data will be forwarded to the relevant end-users without transiting through the LAN hub. Data as video is directly sent by Quadrature Amplitude Modulation (QAM) Modulator Unit (QMU) to cabin enhanced Area Distribution Boxes (ADBs).

NOTE: Any exchange (orders and data requests) with the interactive unit will be done through the token ring (e.g. Individual screen main menu).

The IFE system is capable of various services. Data to end-users also come from components external to the IFE system (PFIS, TACS, etc). In this case, the EPESC controls and monitors the data flow. The EPESC is used as a bridge for transmission of control data to the cabin and seat networks.

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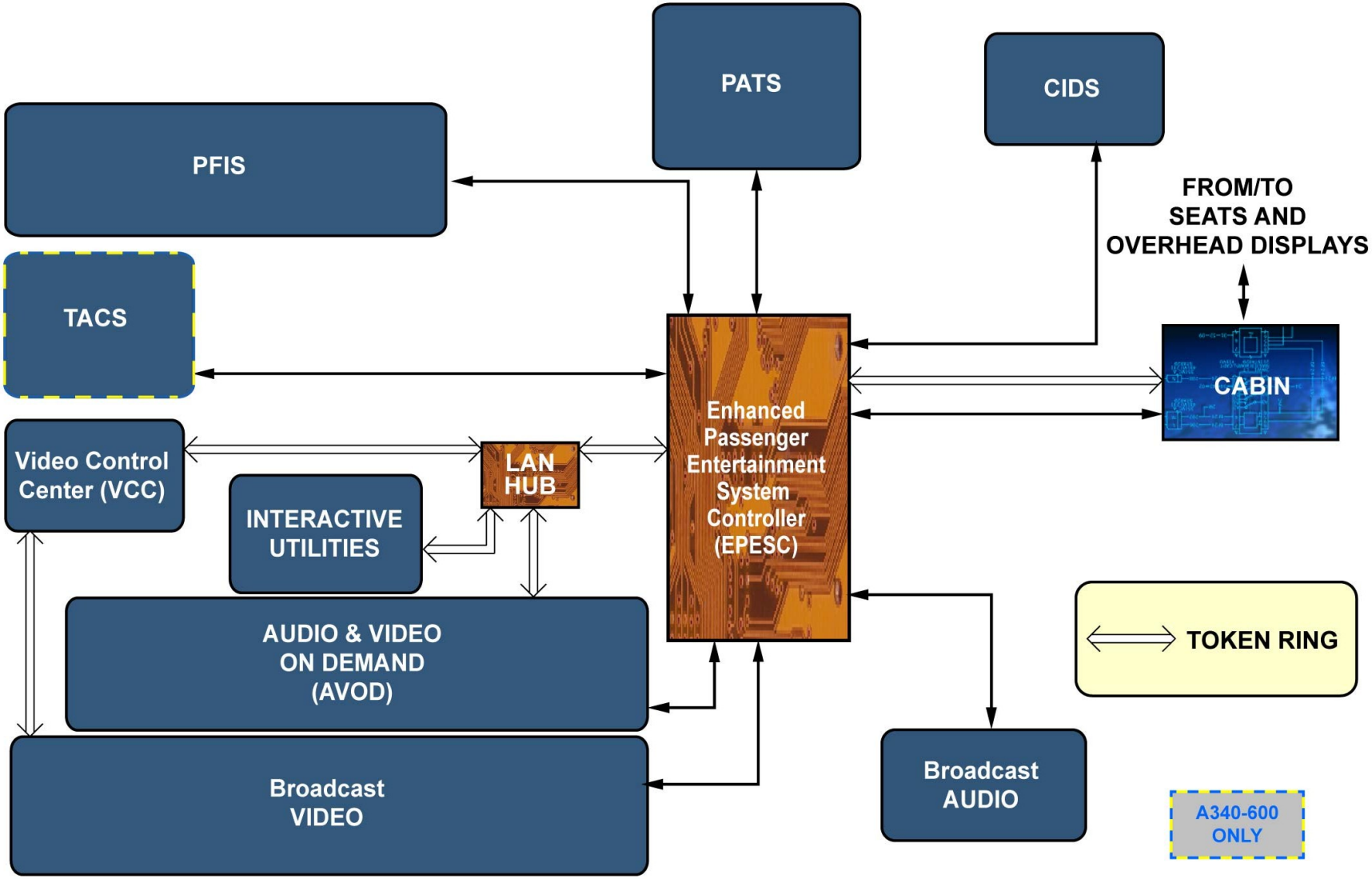

OVERVIEW

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IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

TOKEN RING NETWORK

A token ring LAN is a circle network (ring) that links several components or stations. To get a data transmission cycle complete, the token runs three rounds on the ring. There is always one token circulating on the ring. The LAN HUB controls particularly its speed and its integrity.
The "want-to-talk" station traps the free token, attaches its message (frame) and releases the token on the ring. The frame contains the destination station address, the transmitter address and the data message.
The token runs from one station to another until it reaches the destination station. Each intermediate station acquires and repeats the token with respect to the ring rotation.
When the destination station receives the token, it copies the frame, acknowledges the receipt and releases the token on the ring.
The token, with its frame, carries on its way on the ring without changing its pace or course. When the transmitter station receives an acknowledged token, it stops the token, deletes the frame and releases the free token on the ring.

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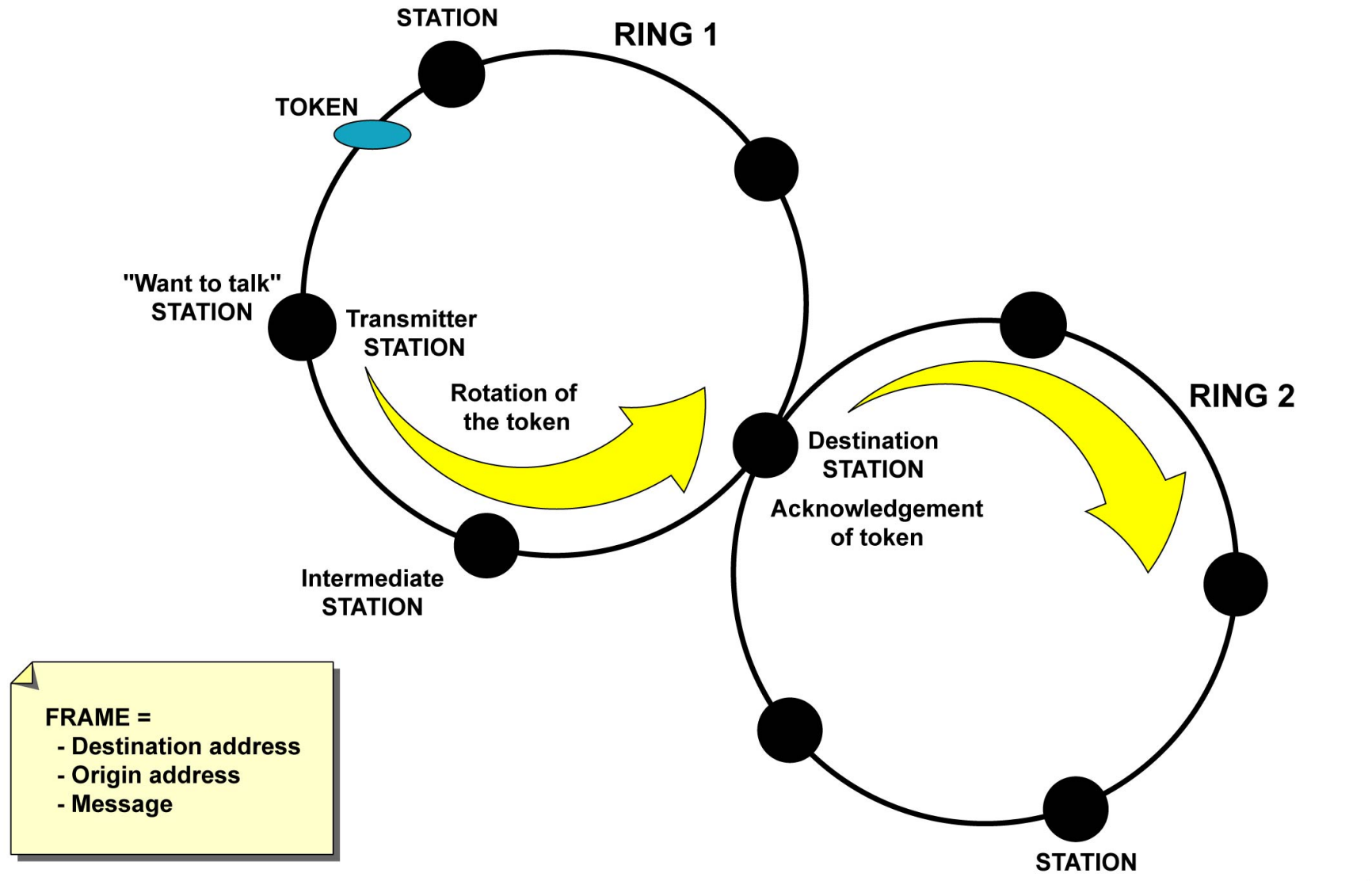

TOKEN RING NETWORK

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IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

IFE SYSTEM TOKEN RING LANs

The IFE system uses three token ring LANs:
- the core token ring LAN,
- the cabin token ring LAN,
- and a seat token ring LAN.

The core LAN links the IFE system LRUs, the LAN hub, the CMT and the EPESC together. All the elements are located in the EE-Bay or in the VCC. The LAN hub is a distribution device. It supplies a central connection point for core LAN. It also shows on its front face the electrical connection status of the connected LRUs. The EPESC relays the token ring to the cabin LAN.
The cabin LAN is composed of 11 video on demand enhanced ADBs.

NOTE: The number of video on demand enhanced ADBs may differ according to your A/C type and configuration.

Each video on demand enhanced ADB relays the token ring to the seat LAN.
The seat LAN is mainly composed of several Digital Seat Electronic Boxes (DSEBs) and enhanced ADBs. Each DSEB can interface with two or three seats. The DSEBs, when powered, store the part of IFE software allocated to the cabin seat it is attached to. It also contains the main menu specific to the cabin seat, as well as some basic commercial video and audio. These items are stored in the RAM and will be deleted when the DSEB is de-energized.

NOTE: The CMT is also connected to a dedicated DSEB. This enables the crew to preview IFE services from the CMT.

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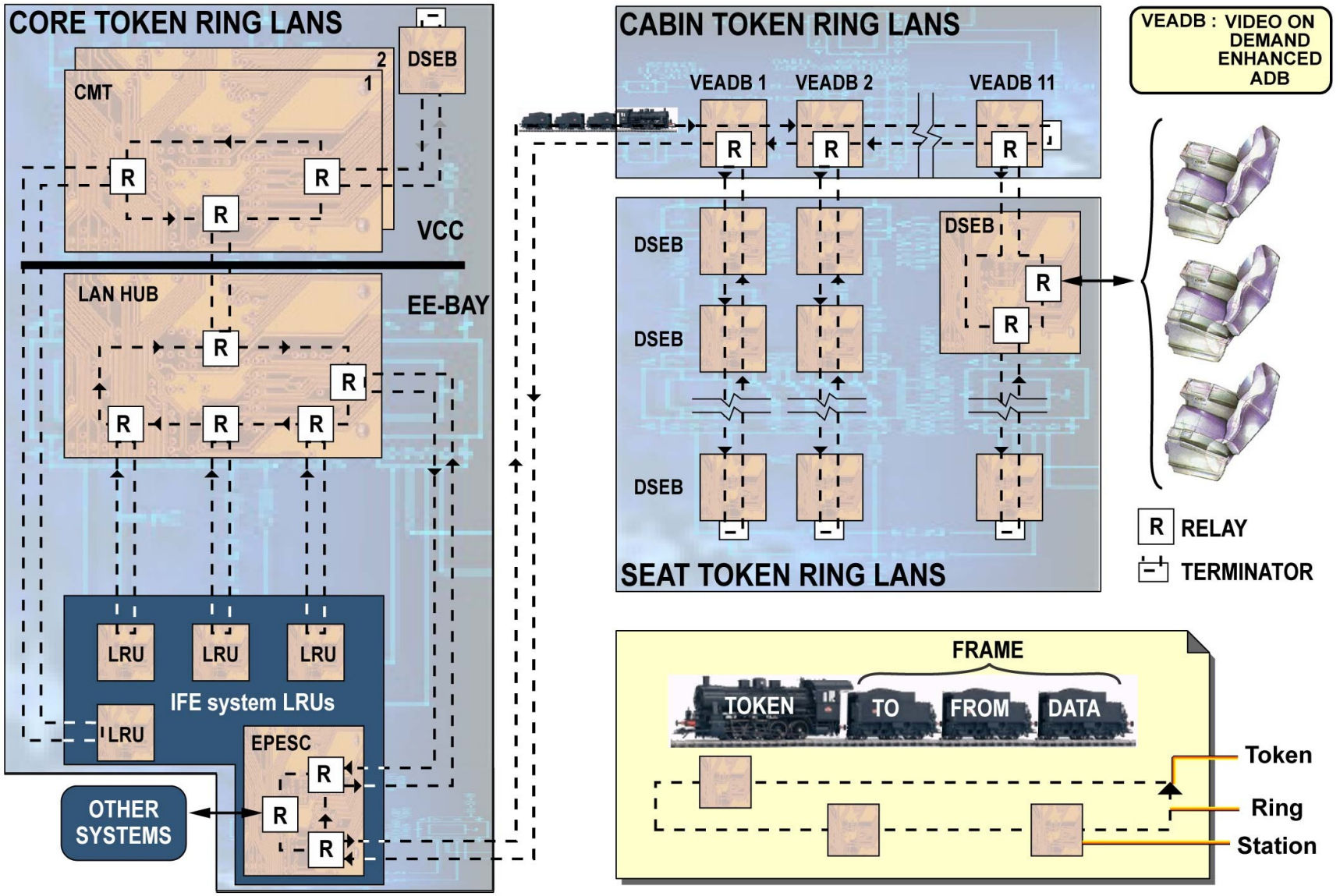

IFE SYSTEM TOKEN RING LANS

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IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

INTERACTIVE UTILITIES

The IFE system is capable of interactive utilities. This means that the IFE system gives to the passengers personal application data (software). The major component is the Cabin passenger management system Memory Expansion Unit (CMEU).
The CMEU is similar to a server. The CMEU contains all the IFE software that can be used by the passengers in the cabin and seat networks (through the EPESC) and enhanced ADBs respectively. The CMEU will supply the software according to a given sequence at the end of its power-up.
The main items of software that are proposed are:
- an interactive menu displayed on the individual screen at IFE system power-up,
- video games,
- internet applications (shopping, electronic libraries,...).

DESCRIPTION

The IFE system has two CMEUs. If one CMEU fails, the system is still operative but will be slower. Software can be downloaded into the CMEUs:
- from the Hard Disk Drive Arrays (HDDAs), located in the IFEC, via the token ring LANs,
- or directly from an external floppy disk, high speed data loader or CD-ROM.

The CMEU has a Built-In Test Equipment (BITE).
The HDDA stores MPEG data consisting of digital audio, video and audio-video program files for distribution.
The FCH does the HDDA file transfer, but also command transfer from QMU to HDDA and BITE initialization. It also does the readiness of Audio and Video On Demand for distribution in case of HDDA failure.
The QMU is a controller/processor transmitting a large number of digital media channels within a limited bandwidth and a single coax cable (RF carrier). It also is used for the broadcast of Audio and Video On Demand to passengers. It commands the BITE process of all HDDA and does the monitoring.

OPERATION

The interactive software is uploaded from the CMEU internal memory (Hard Drive Disk) to the Digital Seat Electronic Boxes (DSEBs) during system initialization. The CMEU controls the software status of the IFE LRUs on boot-up. When necessary, the CMEU uploads updated software to the reporting LRUs.
At power-up, software uploading (main and interactive menus as well as configuration files) is done zone by zone. The uploading is done from the front of the A/C to the rear. The total uploading time is around 10 minutes. It could differ according to the A/C configuration and the IFE system configuration. The DSEB sends token ring commands through EADBs, BITE status reports and telephone voice data.
The DSEBs act as the Random Access Memory (RAM) of a personal computer. They enable the playing and the displaying of software on the individual video screens. The DSEB supplies video, audio and power to the PSS elements, as well as commands signals and data.
The CMEU also uploads software on passenger request. The passenger request is received by the DSEB, converted into a token and sent to the CMEU.
The CMEU processes the request and uploads the requested software to the relevant seat. The software is sent to the appropriate DSEB using the token ring LANs. The data is uploaded in 2 KB packets.
Upon completion of software uploading from CMEU, some Audio and Video On Demand filer can be automatically called for storage in the DSEB RAM. This is ensured by data file transfer via the EPESC and the token rings.

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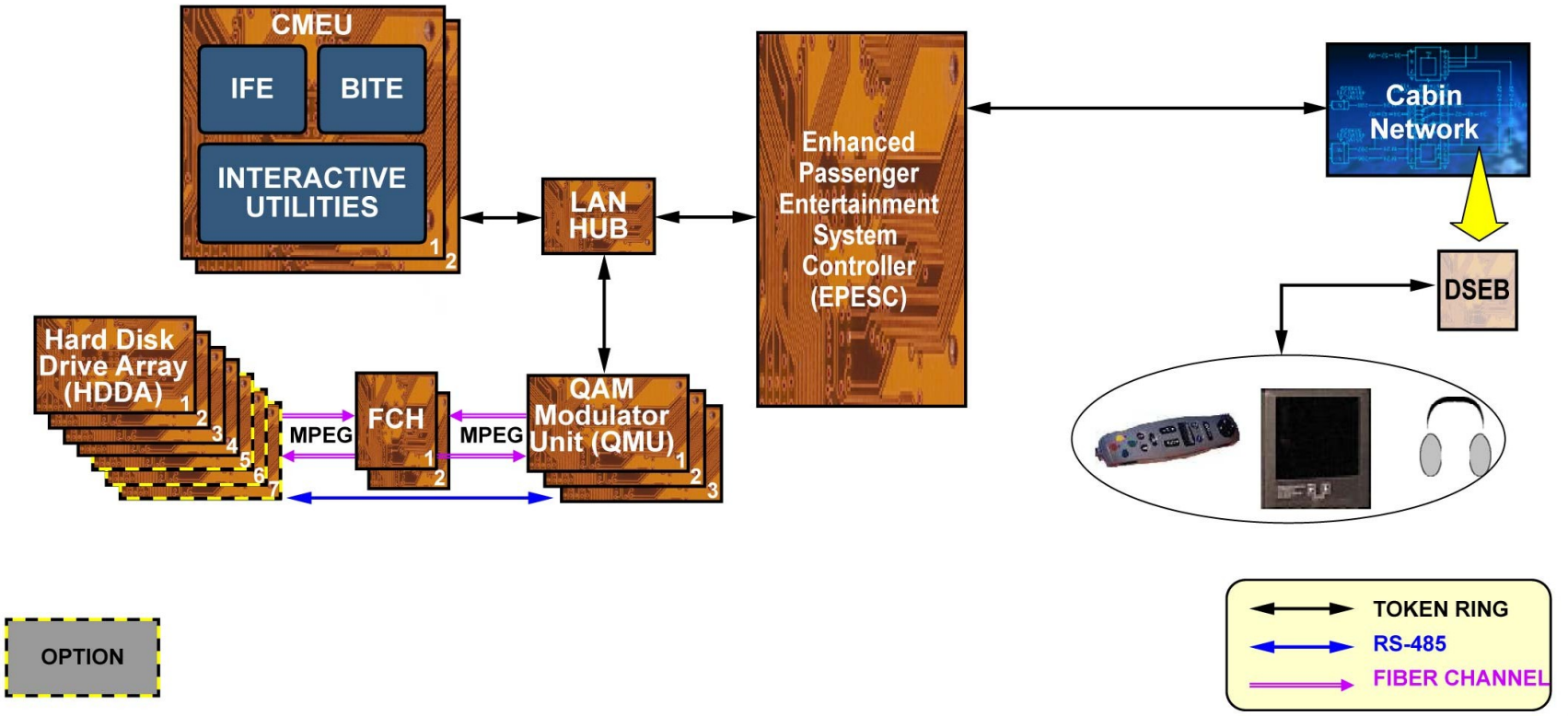
QAM: Quadrature Amplitude Modulation
FCH: Fiber Channel Hub
CMEU: Cabin Memory Expansion Unit
DSEB: Digital Seat Electronic Box



INTERACTIVE UTILITIES - DESCRIPTION & OPERATION

IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

AUDIO FEATURES

There are three operating audio modes:
- audio from broadcast programs,
- Audio On Demand (AOD),
- audio from the PA system.

AUDIO BROADCAST

Audio sources are either "classic" Audio Reproducers (A/Rs) like a compact disc reader, or digital audio data (MPEG files).

NOTE: MPEG stands for Motion Picture Experts Group.

The A/Rs can be located either in the IFEC or in the VCC. Their number and location differ according to the A/C configuration. The audio program is mainly broadcasted from A/Rs. In this case, the analog audio signal is directly sent from the A/Rs to the EPESC. The EPESC processes the signal and sends it to a Radio Frequency Combiner Splitter (RFCS). The main role of a RFCS is to combine several types of signals into a single signal held on a single carrier and vice versa. The RFCS is a passive device consisting of a constant impedance transformer. The RFCS sends the signal to a Radio Frequency Distribution Amplifier (RFDA) that distributes the audio signal to the passengers through the cabin network.

MPEG audio files can also be used for broadcasting audio programs. The MPEG files are stored in several Hard Disk Drive Arrays (HDDAs). The MPEG files are sent to the Quadrature amplitude modulation Modulator Unit (QMU) through fiber channels. A Fiber Channel Hub (FCH) is required for interfacing the HDDAs with the QMUs. This fiber channel hub supplies an optical transfer path from HDDA to HDDA, permitting media loading transfer at High Speed (HS) (100MB/s). A Portable Data Loader (PDL) can be plugged into the FCH for MPEG file downloading.

The QMUs control the flow of data from the HDDAs. The QMUs convert the digital MPEG files into a specific analog Radio Frequency signal (RF QAM). This signal is then directly sent to the RFCSs for distribution to the cabin network.

NOTE: QAM stands for Quadrature Amplitude Modulation. Several sets of MPEG data can be modulated into a single RF QAM signal.

In addition, the QMUs transmit a token to inform the cabin network on how to demodulate the required signal and how to demultiplex the proper MPEG block from the whole RF stream. The broadcast programs can be controlled from the VCC and sent to the cabin loudspeakers through the CIDS DIRs, for Passenger Address (PA) purpose.

NOTE: The HDDAs, the QMUs and the FCHs are located in the IFEC in the EE-Bay.

AUDIO ON DEMAND

Each passenger can choose, from a pre-determined menu, a selection of audio programs. The selection is made from the seat using the PCU or the tactile screen. The passenger selection is sent to the cabin network via the seat token ring LAN. The token then gets to the QMU. It acknowledges the receipt of the token and processes a request to the HDDAs.

The AOD sources are MPEG data files located in the HDDAs. The MPEG files are sent to the QMUs, converted into an analog RF QAM signal and distributed to the cabin network. The QMU also emits a token to inform the cabin network how to address the required audio signal to the required seat.

AUDIO FROM PASSENGER ADDRESS

PA messages broadcasted by the crew are sent to the cabin loudspeakers. The PA messages are also sent to the EPESC. The

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EPESC broadcasts the PA messages to the passengers headsets via the cabin network. As the PA has priority over the IFE system, all current IFE system services are frozen to allow PA messages to be heard.

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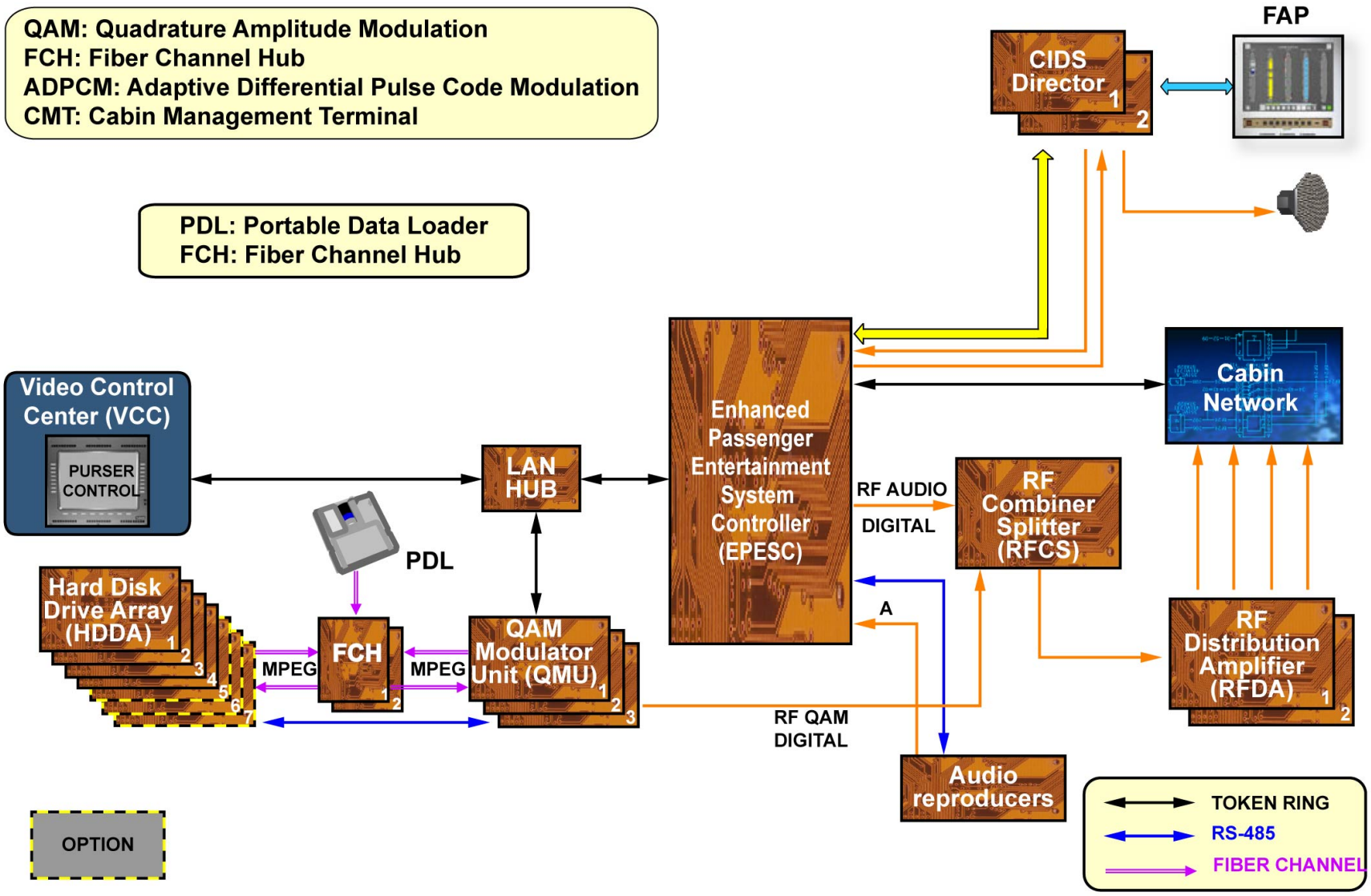

AUDIO FEATURES - AUDIO BROADCAST ... AUDIO FROM PASSENGER ADDRESS

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IFE SYSTEM FUNCTIONALITIES D/O (PANASONIC) (3)

VIDEO FEATURES

There are three operating video modes:
- video from broadcast programs,
- Video On Demand (VOD),
- video for safety procedure demonstration.

VIDEO BROADCAST

Video sources may be "classic" Video Reproducers (V/Rs) like Digital Video Disk (DVD) or Video Cassette Recorder (VCR). Video sources are also digital video data (MPEG files). If the video broadcast sources come from the V/Rs, the information is split into two parts: the video itself and its associated audio. These two sets of data are broadcasted in two different ways. The V/Rs send the analog video to a Video Modulator Unit (VMU). The VMU converts the video signal into a Radio Frequency Video signal (RF video). The VMU sends the signal to an RFCS.

At the same time, the V/Rs send the analog audio signal to the Enhanced Video Control System Unit (EVSCU). The EVSCU converts the audio signal into a 4-bit digital signal. This kind of signal is called ADPCM for Adaptive Differential Pulse Code Modulation. This signal is then routed to the RFCS, which also receives the associated video signal.

The RFCS combines the two signals into a single RF Video/ADPCM signal and sends it to the EPESC. The EPESC sends the signal to the cabin network for broadcasting at seat level and/or overhead display level. The associated audio can also be sent to the cabin loudspeakers through the CIDS directors. If the broadcast video sources come from MPEG files, operation is similar to the broadcast audio from V/R's. The QMU sends a RF QAM signal to the cabin network directly.

The QMU transmits a token to inform the cabin network (enhanced ADBs and concerned DSEBs) on how to demodulate the proper RF and how to demultiplex the proper MPEG block from the MPEG transport stream. The broadcast program is normally selected from the VCC. The crew selection is sent to the EVSCU via a token ring. The EVSCU then relays the selection to the V/Rs.

VIDEO ON DEMAND

The VOD operation is similar to the AOD operation. Each passenger can choose, from a pre-determined menu, a selection of video programs. The selection is made from the seat using the PCU or the tactile screen. The passenger selection is sent to the cabin network, via the seat token ring LAN. The token arrives to the QMU. It acknowledges the receipt of the token and processes a request to the HDDAs.

The VOD sources are MPEG data files located in the HDDAs. The MPEG files are sent to the QMUs, converted into an analog signal and supplied to the cabin network. The QMU also emits a token to inform the cabin network on how to address the required video signal to the appropriate seat.

SAFETY DEMONSTRATION VIDEO

The cabin crew can also broadcast safety demonstration videos. The cabin crew controls the operation from the VCC. Usually safety demonstrations are recorded on "classic" V/Rs. They are broadcasted to the passengers as explained before. As with the PA announcements, the safety demonstrations have priority over the IFE system, all current IFE system services are cancelled during safety demonstrations.

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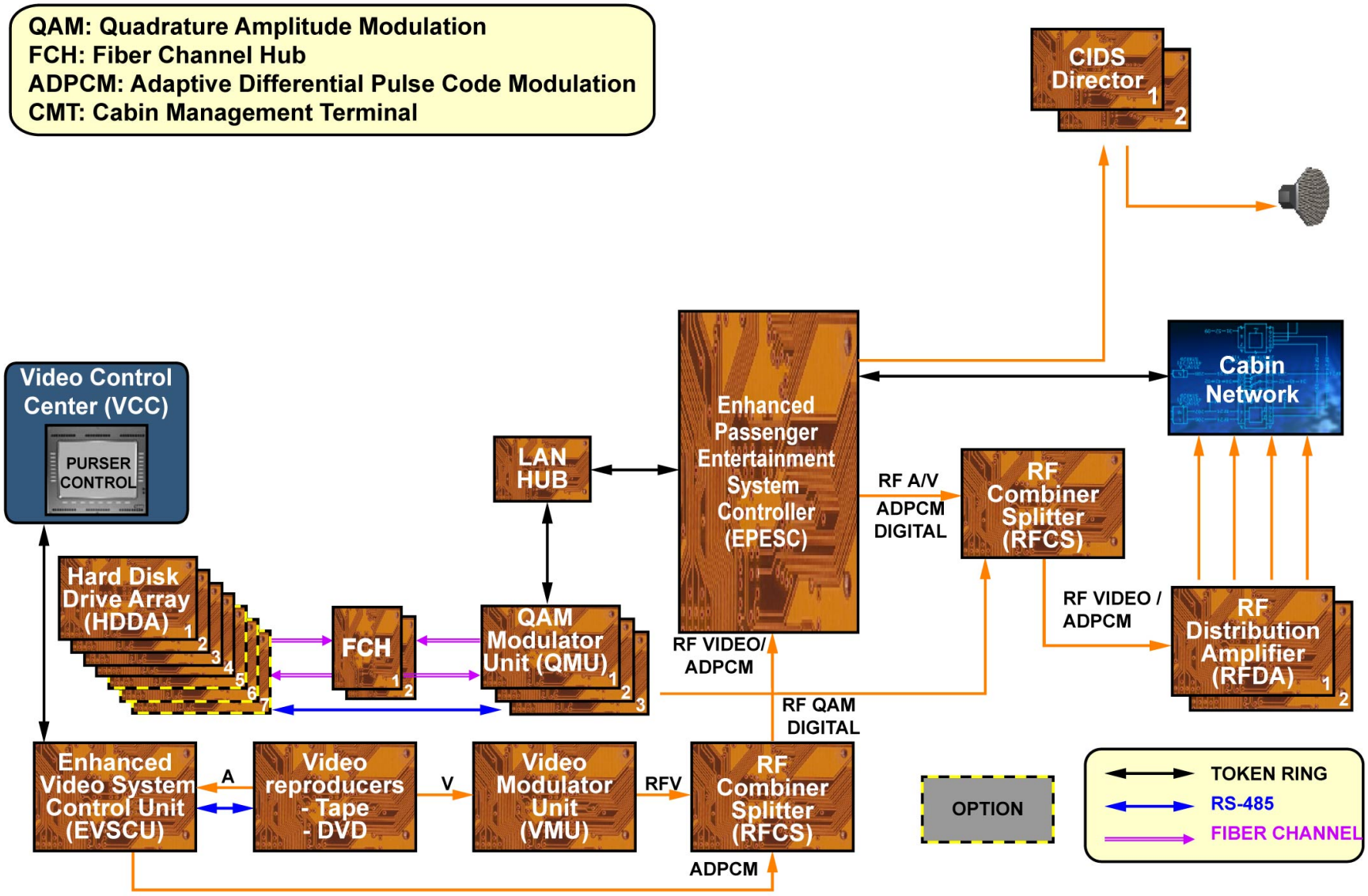

VIDEO FEATURES - VIDEO BROADCAST ... SAFETY DEMONSTRATION VIDEO

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IFE SYSTEM D/O (PANASONIC) (3)

SYSTEM INTERFACE

The In-Flight Entertainment (IFE) system also interfaces with the following A/C systems:
- Passenger Air-to-ground Telephone System (PATS),
- Passenger Flight Information System (PFIS),
- Taxi Aid Camera System (TACS) (A340-600 only).

PATS

The IFE system lets each passenger use individual telephones. The Passenger Control Unit (PCU) has a keyboard, a microphone and a loudspeaker like a conventional telephone handset.
The passenger telephone request is acquired by the Digital Seat Electronic Box (DSEB). The DSEB converts the request into a token and sends it to the Enhanced Passenger Entertainment System Controller (EPESC) via the cabin network.
The EPESC processes the request and sends it to the Cabin Telecommunications Unit (CTU).
A telephone communication is then opened using the SATCOM system of the A/C. The telephone signal between the EPESC, the CTU and the SATCOM is encoded into a specific digital signal.
The EPESC processes this signal and converts it into a token ring message. The communication is then relayed to the passengers via the token ring Local Area Networks (LANs).

PFIS

The PFIS continuously gives updated flight and destination information to the passengers.
The main components of the PFIS are the Random Access Device (RAD) and the Digital Interface Unit (DIU).
The DIU uses data from A/C systems to build the requested screens.
The RAD is a CD-based random access digital audio/video reproducer.
Depending on A/C position, the RAD will automatically provide video sequences to the passengers for example details on the country overflown, points of interest, or safety procedures.
The PFIS sends to the IFES video and audio data.
Audio data is directly sent to the EPESC. The EPESC processes the audio signal and sends it to the Radio Frequency Combiner Splitter (RFCS) for cabin network broadcasting.
The RAD sends the analog video to a Video Modulator Unit (VMU).
The VMU converts the video signal into a Radio Frequency Video signal (RF video). The VMU sends the signal to a RFCS for cabin network broadcasting.
Data from the PFIS can be requested either by the crew from the Video Control Center (VCC), or by the passengers from the PCU or the tactile screen. In both cases, the EPESC acquires the request from the token ring LANs, and sends it to the DIU. Data from the PFIS can be broadcasted on the overhead displays or on the individual passenger screens.

TACS (A340-600 ONLY)

The IFES system enables an interface with the TACS. For taxiing purposes, the TACS enables the video images of the NLG and MLG to be displayed on the CAPT and F/O Primary Flight Displays (PFDs) and the ECAM SD.
The TACS uses a Camera Interface Unit (CIU) for the processing of video signal. Upon EPESC request, the CIU video signal is sent to the VMU.
The VMU converts the video signal into a Radio Frequency video signal (RF video). The VMU sends the signal to a RFCS for cabin network broadcasting.
Video from the TACS can be requested either by the cabin crew from the VCC, or by the passengers from the PCU or the tactile screen. In both cases, the EPESC acquires the request from the token ring LANs, and sends it to the CIU.

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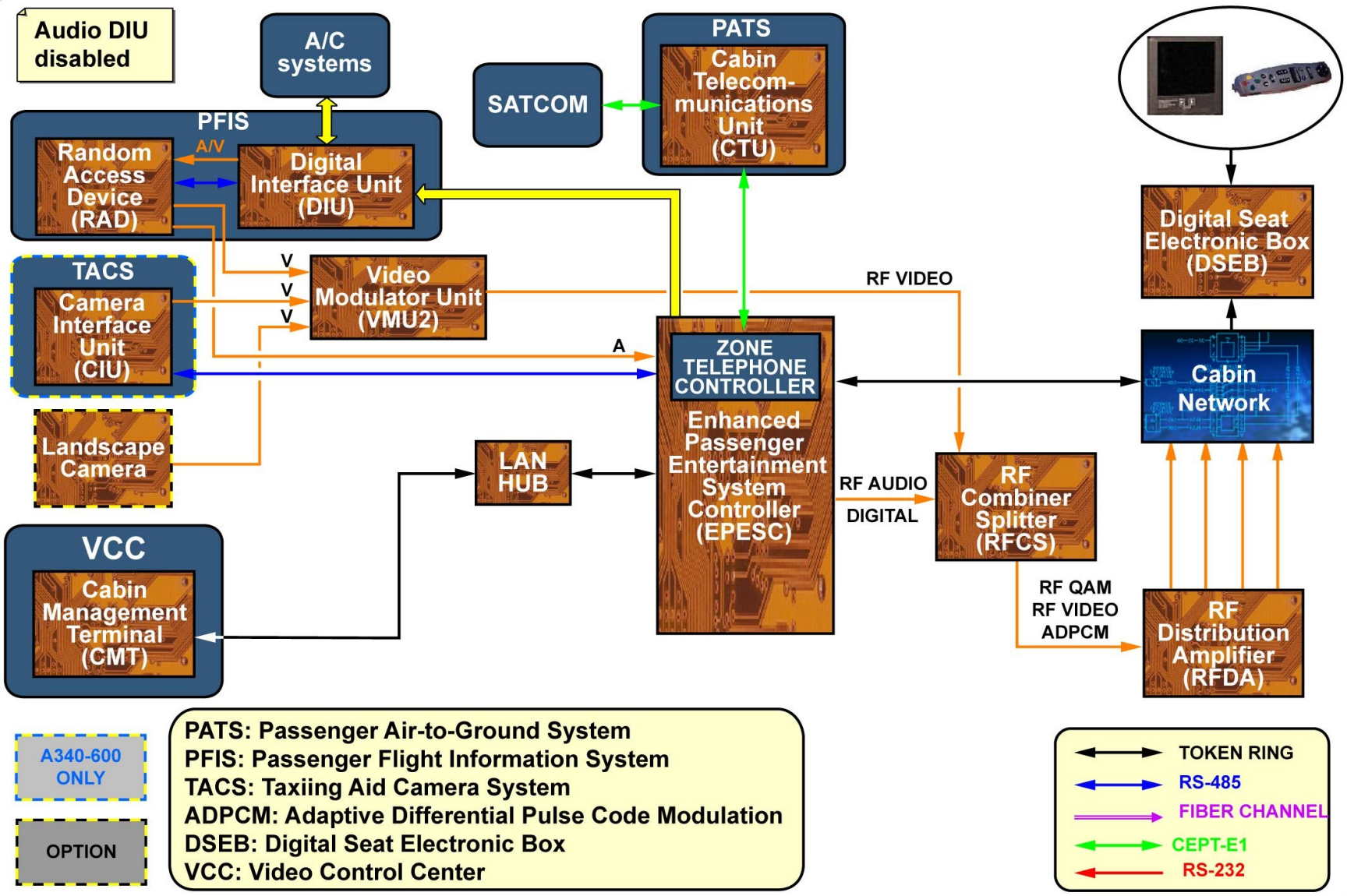

SYSTEM INTERFACE - PATS ... TACS (A340-600 ONLY)

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IFE SYSTEM D/O (PANASONIC) (3)

PATS

The main component of the Passenger Air-to-Ground Telephone System (PATS) is the Telecommunications Unit (CTU). It is installed in the avionics compartment. It gives the cabin telephone and data transmission capabilities, and is responsible for the air to ground calls and fax.
The A/C can have different telecommunication systems:
- wall-mounted telephone, and in-seat telephone,
- digital printer / fax machine,- cordless telephone and Cabin Wire Less Unit (CWLU). The CWLU is part of "Fly Smart".

Communication is achieved, directly or via the IFE system, with the CTU, which transmits communications to the SATCOM.
The CTU receives voice data originating from the passenger telephone handsets and converted to CEPT.E1 protocol by the zone telephone controller found in the EPESC. It also receives voice data originating from the ground public telephone network through the SATCOM. The CTU concentrates voice data, credit card data and telephone number data from cabin seats as well as ground telephone voice data to transmit to the passenger handset. Failure of the zone telephone controller in the EPESC to translate token ring to CEPT.E1 will stop all telephone and fax communication.

NOTE: CEPT.E1 (Conference European Post and Telecommunications standard E1) is a digital telecommunications protocol.

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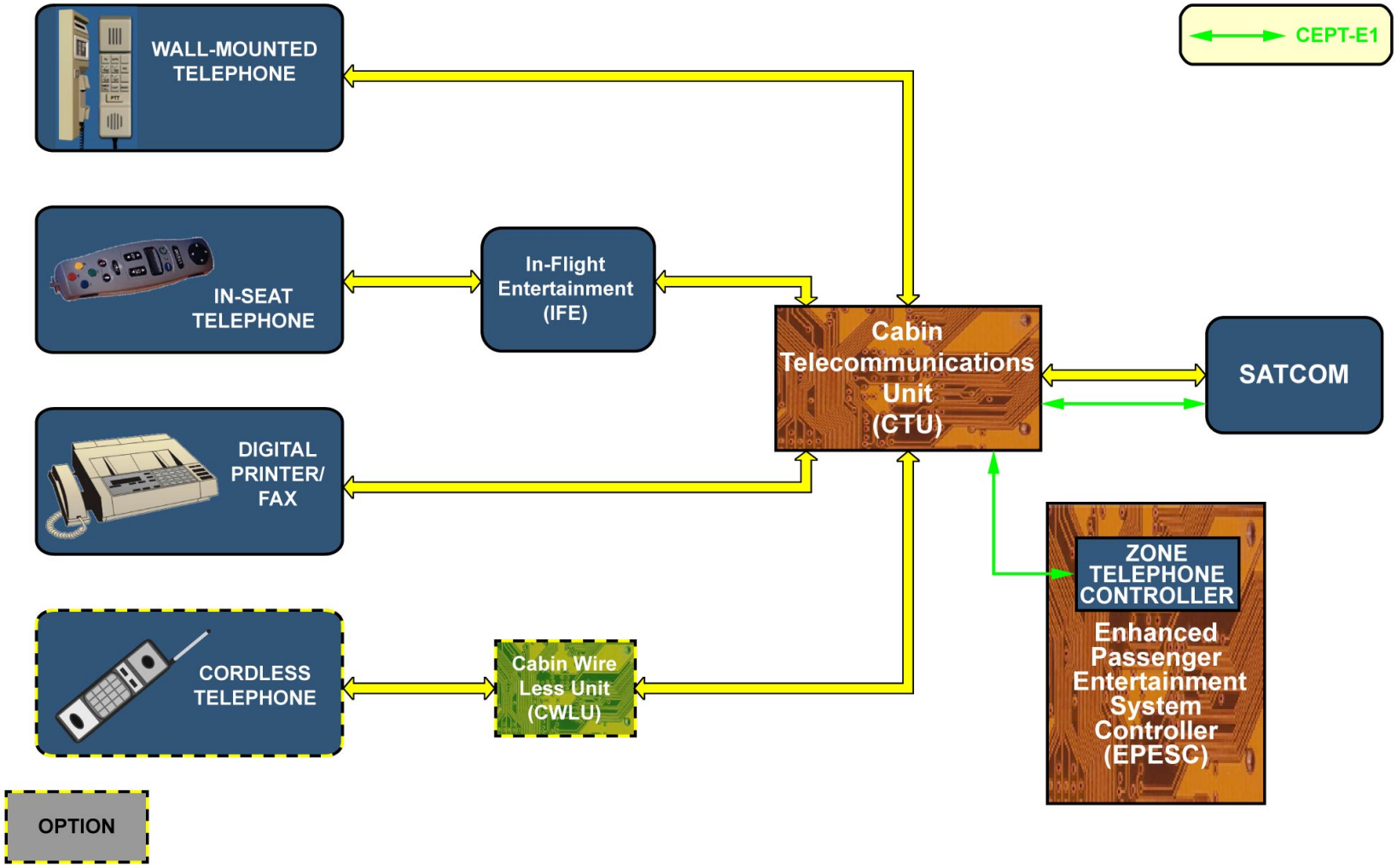

PATS

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IFE SYSTEM D/O (PANASONIC) (3)

PATS (continued)

COMPONENT LOCATION

The component location of the PATS is described on A340-600, in this example. It is composed of a fixed handset and a telephone antenna (PANASONIC).

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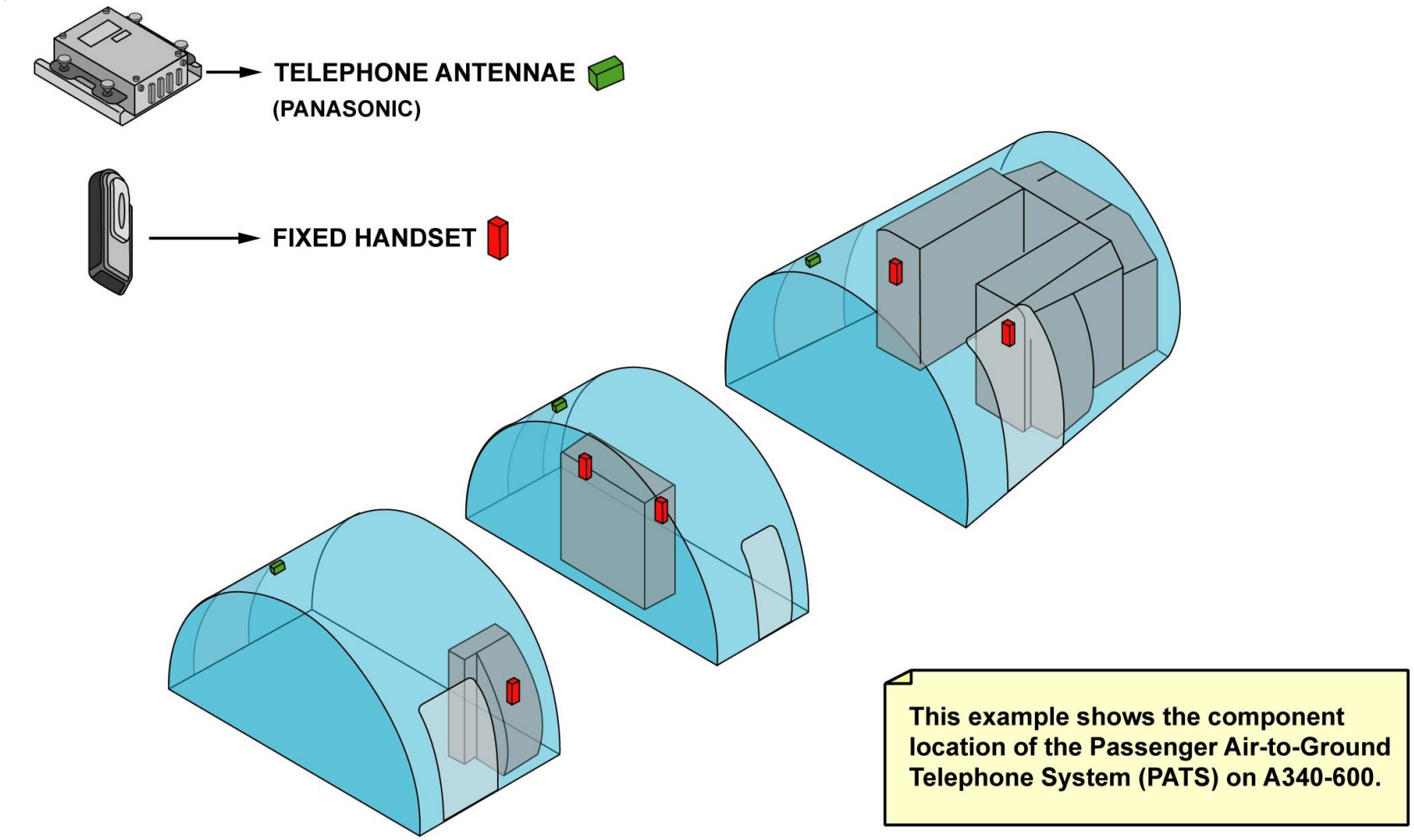
TELEPHONE ANTENNAE
(PANASONIC)
FIXED HANDSET
This example shows the component location of the Passenger Air-to-Ground Telephone System (PATS) on A340-600.

PATS - COMPONENT LOCATION

IFE SYSTEM D/O (PANASONIC) (3)

PATS (continued)

SYSTEM DESCRIPTION

To make an air-to-ground telephone call as easy as possible, the PATS is designed to operate like a public phone. In some features, the PATS is different from a public telephone (e.g insert credit card for payment) and the passenger gets additional information by messages through the handset display. Additional instructions are given to passenger on the display window of the telephone handset. The PATS has three independent systems, including several components:
- the cabin distribution system (fixed-wired telephone system),
- the SATCOM (bearer system),
- CTU (interface box).

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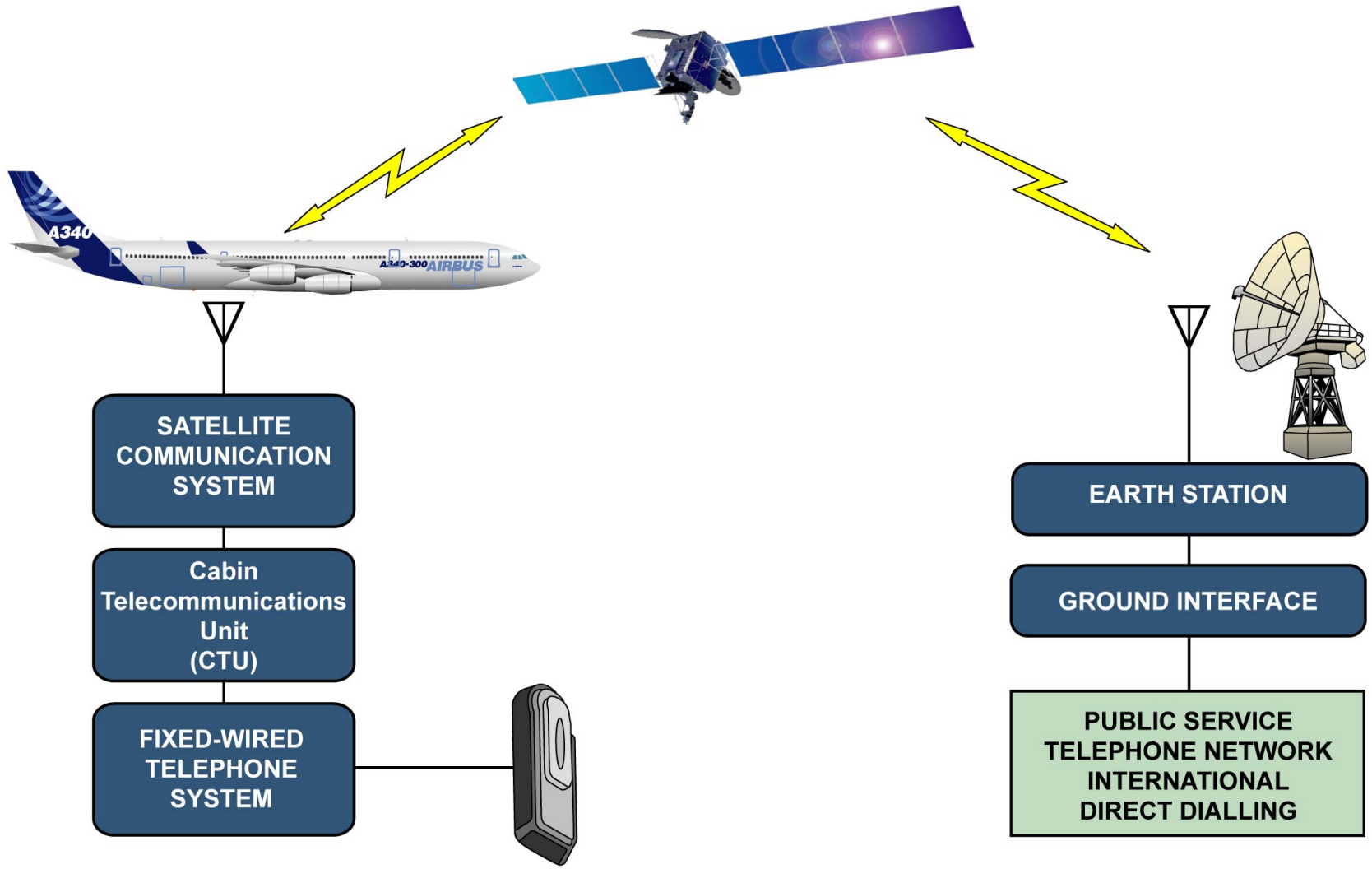

PATS - SYSTEM DESCRIPTION

IFE SYSTEM D/O (PANASONIC) (3)

CABIN AND SEAT NETWORKS

The IFE data is dispatched to the end-users via the cabin network and the seat network. The end users are either the overhead displays or the passenger seats (PCU, screen and headset).
Two sorts of data are dispatched to the cabin and seat networks. The first set of data comes from the EPESC through the token ring.
The second set of data comes from the two RFDAs through classic analog RF links.
The EPESC interfaces with the cabin token ring LAN. Each video on demand enhanced Area Distribution Box (ADB) sends the token ring from the EPESC to the seat token ring LAN via the Floor Distribution Boxes (FDBs).
The seat LAN is composed of several DSEBs. The number of video on demand enhanced ADBs, FDBs and DSEBs differs according to the A/C type and configuration. In any case, each DSEB is capable of interfacing with three seats. At each end of seat token ring, the last DSEB has a terminating resistor. The last enhanced ADB of the cabin token ring also has a simulator terminator to make sure that the proper token ring operates.
The two RFDAs send the RF audio/video signal to the cabin video on demand enhanced ADB network.
Only 4 videos on demand enhanced ADBs directly interface with the RFDAs. The signal is then transmitted from one interfacing video on demand enhanced ADBs to one or two other ones.
The RF audio/video signal is then repeated to the DSEBs (seat network) via the FDBs. The RF video signal is also repeated to several Tapping Units (TUs).
Each DSEB receives both the RF signal and the token ring signal. The DSEB demodulates and demultiplexes the proper block from the whole RF signal according to the key given by the token ring. The DSEB is then able to address the right IFE message at the right seat and at the right devices: PCU, screen or headsets. Moreover, the DSEB is also able to process the interactive software coming from the Cabin Passenger Management Memory Expansion Unit (CMEU) via the token ring. Each TU supplies the overhead/wall-mounted displays with the video signal.

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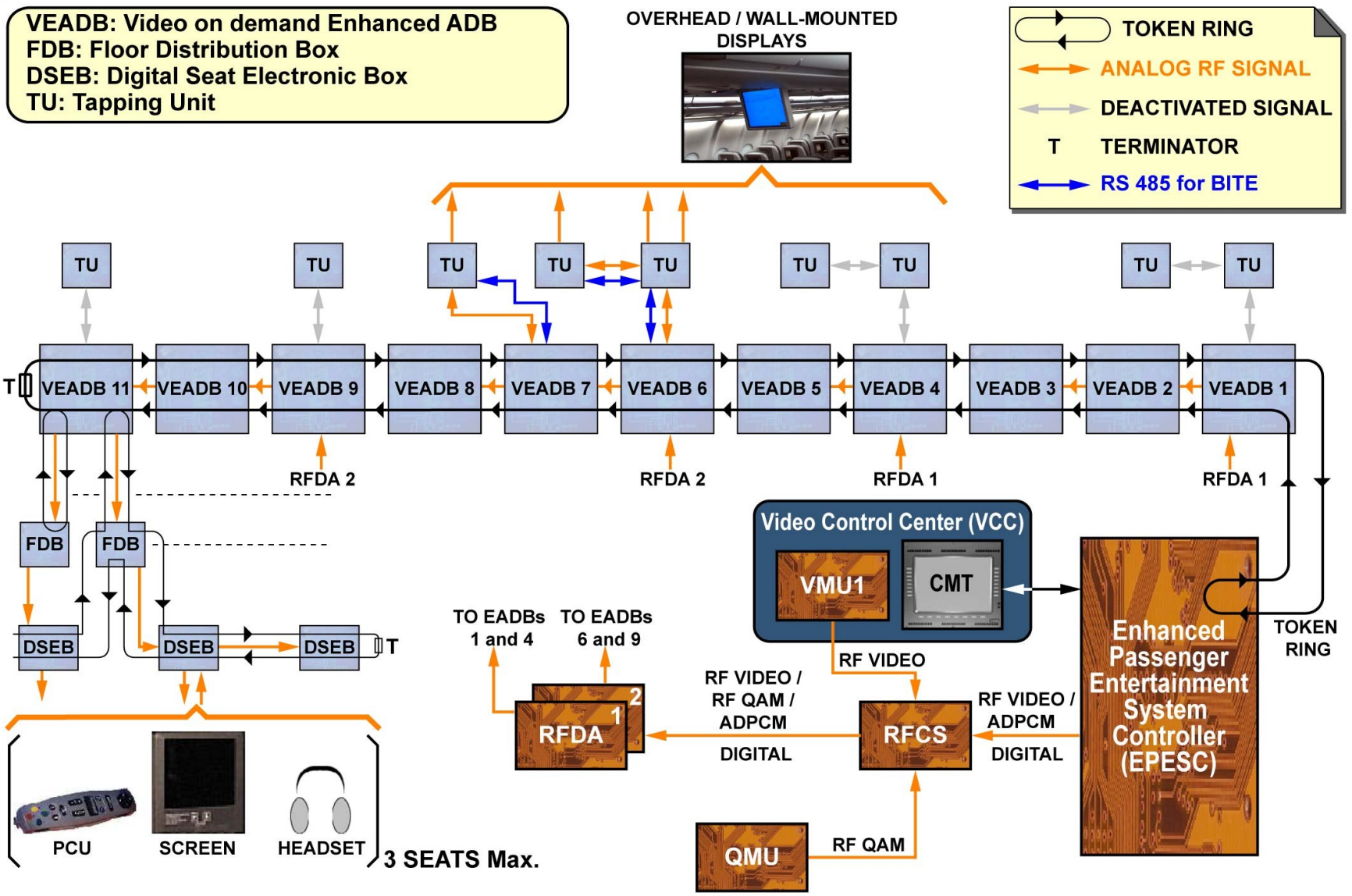

CABIN AND SEAT NETWORKS

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IFE SYSTEM D/O (PANASONIC) (3)

POWER SUPPLY

The IFE system is supplied through the FWD and aft cabin C/B panels.
Three PAX SYS ON/OFF switches located in the cockpit on the overhead panel, in the VCC and on the Flight Attendant Panel (FAP) are used to cut off the power supply to the IFES. To maintain passenger comfort, two additional P/Bs (IFEC SMOKE/OFF and VCC SMOKE/OFF) are installed to enable the crew to cut off electrical power of both IFE compartments in case of smoke detection and loss of ventilation, without the need to cut off the power supply to all passenger systems.
The Electrical Load Management Unit (ELMU) and the COMMERCIAL cockpit switch can also control the Remote Control Circuit Breakers (RCCBs) associated to the IFES.
The VCC is directly connected to the cabin C/B panels. It has a MAIN switch, which cuts off the supply of all the IFE associated systems.
The overhead network is supplied through the TUs and the video on demand enhanced ADBs.
The seat network is supplied through the Master Control Units (MCUs) and the Power Floor Disconnect Boxes (PFDBs). Moreover each seat has C/Bs.
The in-seat C/Bs increase the maintainability and make more flexibility in the IFES operation. Indeed, the Portable Electronic Devices (PEDs) power may be switched off, from the cockpit or the FAP, while maintaining other seat capabilities operative.
The cabin unit, CTU and each holster are supplied with 115VAC from the NORM BUS. The CTU supplies the seat telephone boxes through a fixed-wired telephone cable assembly with the A/C 115VAC power supply. The seat telephone boxes supply a 24VDC to their connected handsets.

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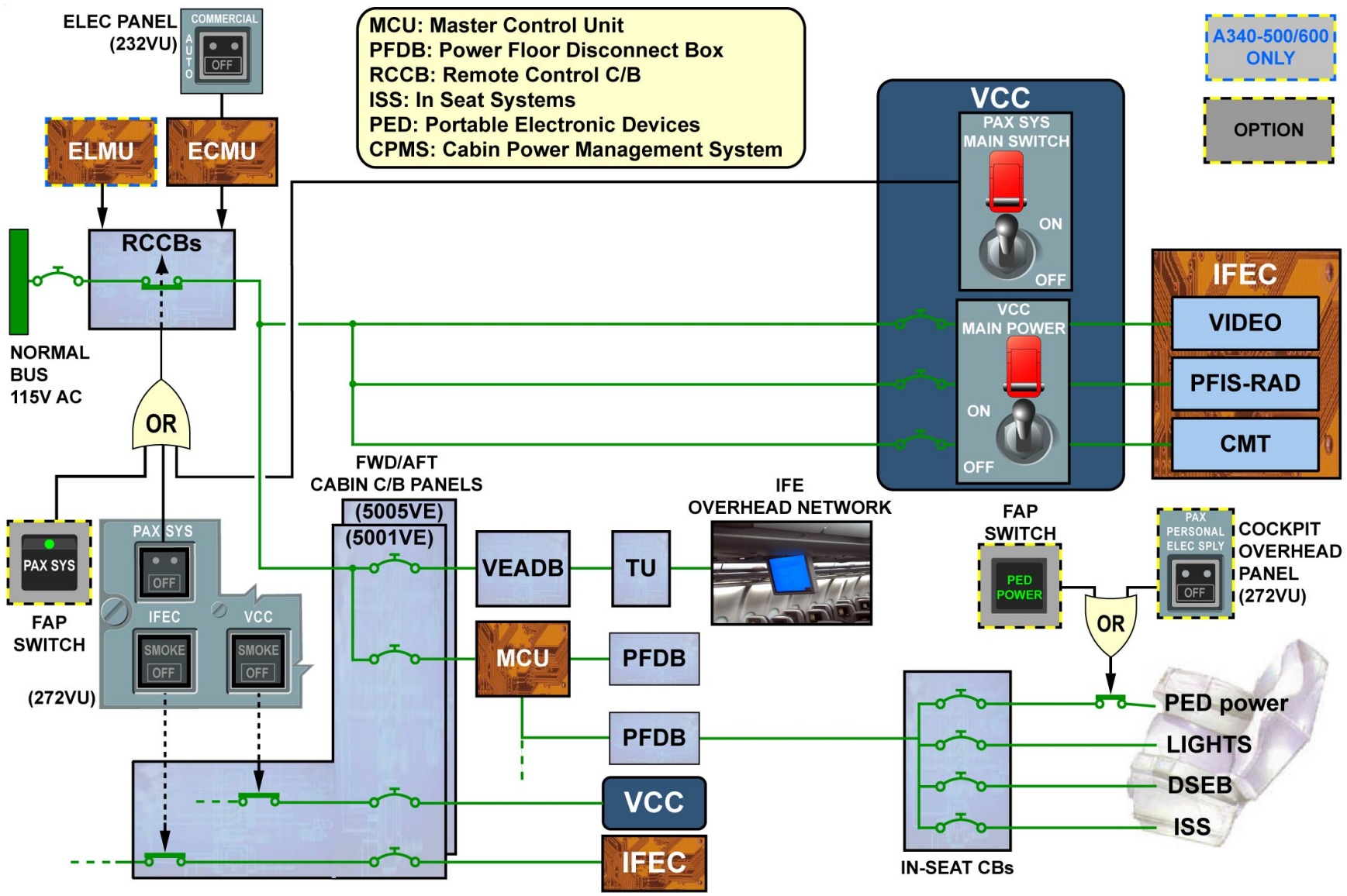

POWER SUPPLY

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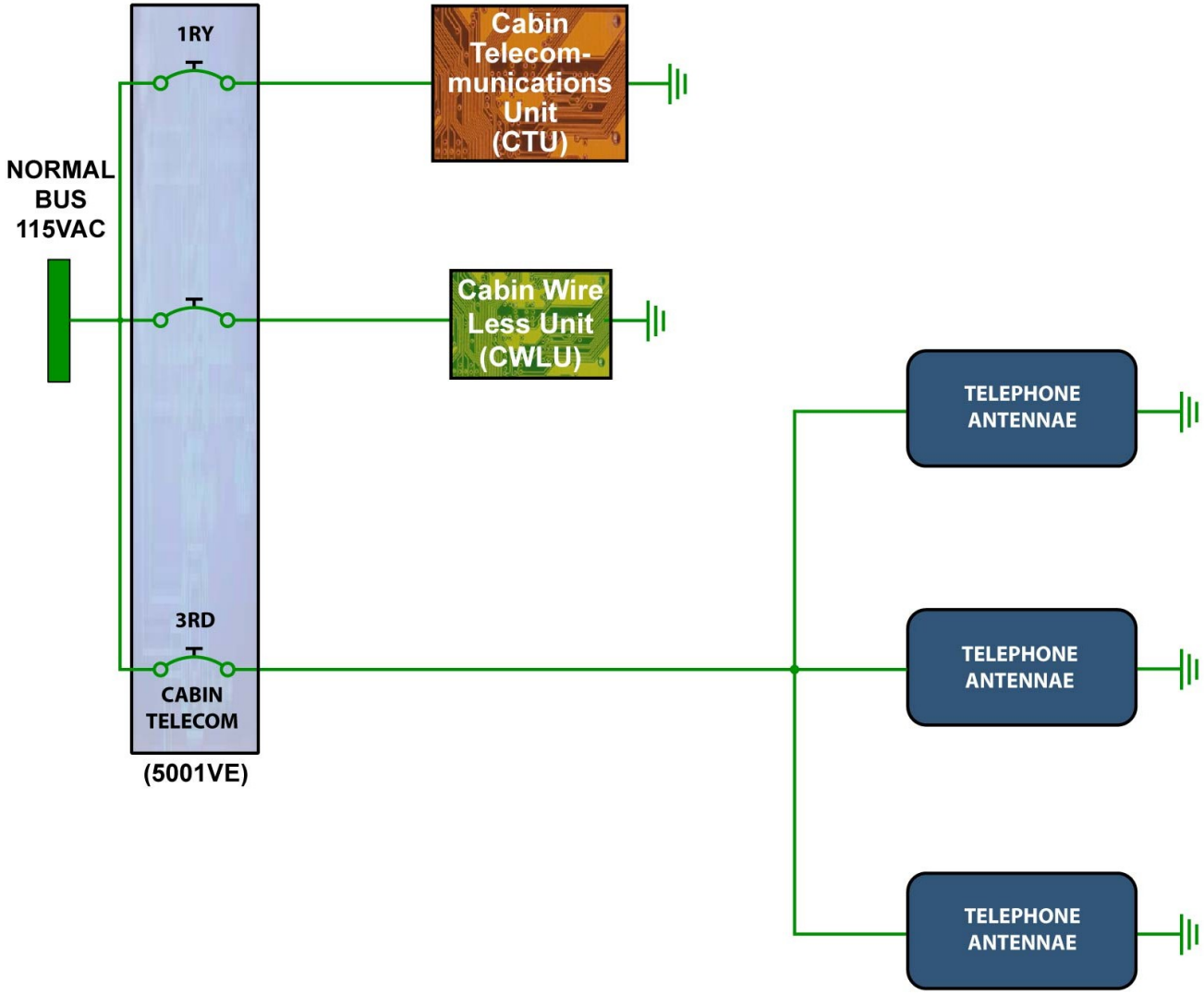

POWER SUPPLY

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IFE SYSTEM D/O (PANASONIC) (3)

BITE

The EPESC centralizes all the BITE status of the IFES LRUs and interfaces with the Central Maintenance Computer (CMC).
Specific interactive maintenance menus are directly accessible from the VCC using the Cabin Management Terminal (CMT).
The "PASSCODE maintenance crew" screen is displayed when the top left (L1) and the top right (R1) line select keys are pushed at the same time. The "PASSCODE cabin crew" screen is displayed when the bottom left (L8) and the bottom right (R8) line select keys are pushed at the same time.
In case of failure of the keyboard (QWERTY), it is possible to use the line and function select keys of the CMT as follows:
- the left line select keys agree with the first 8 letters of the keyboard's first line,
- the right line select keys agree with the first 8 letters of the keyboard's second line,
- the function select keys agree with the 7 letters and the following key of the keyboard's third line.

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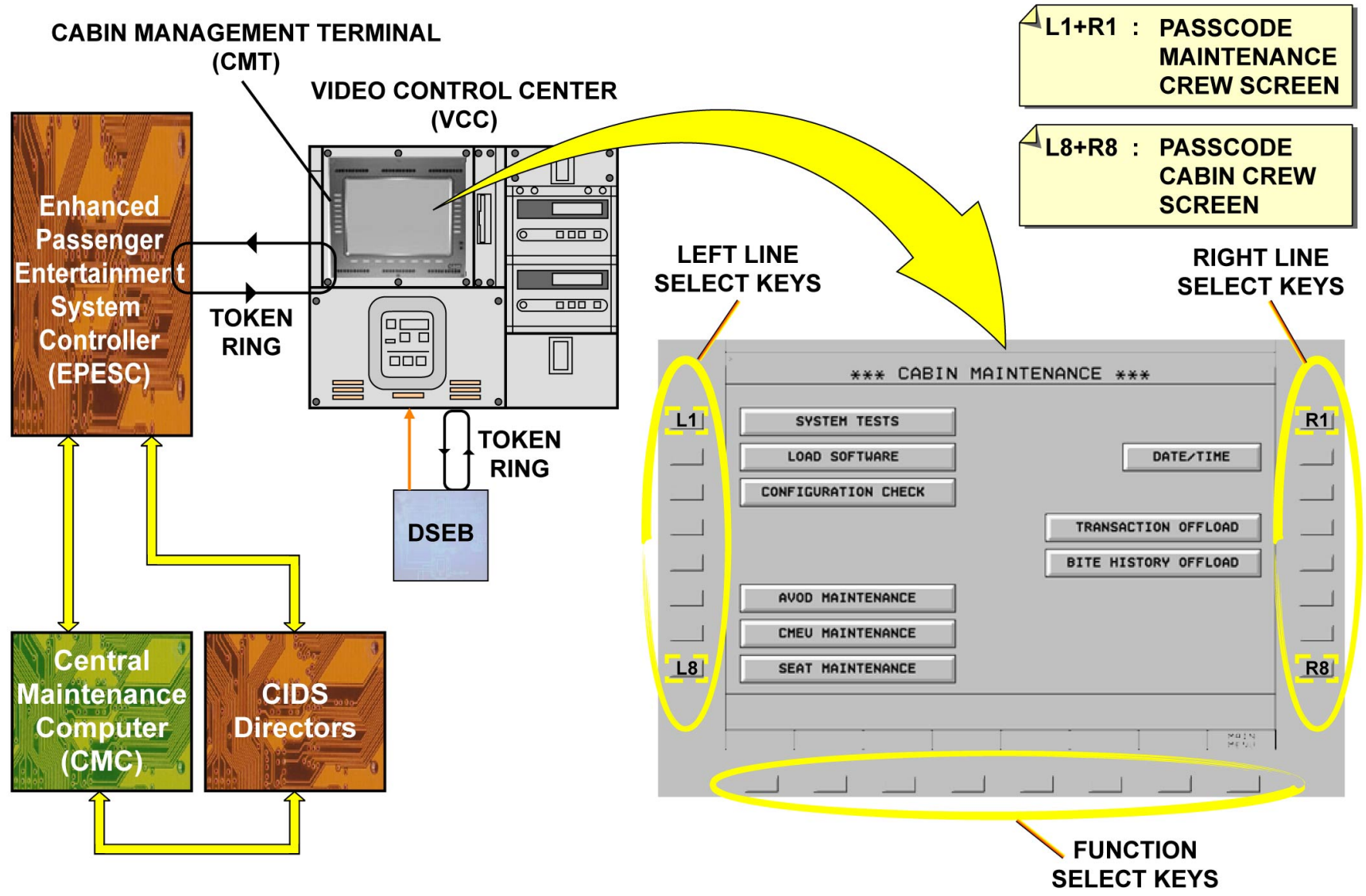

BITE

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IFE SYSTEM D/O (THALES) (3)

INTRODUCTION

The In-Flight Entertainment (IFE) system is an interactive, fully integrated passenger entertainment system. The IFE system offers the passengers the following services:
- "Classic" audio and video broadcast programs,
- safety and information announcements in conjunction with the Passenger Address (PA) system,
- interactive utilities such as video games, internet features, and more,
- Audio and Video On Demand (AVOD),
- reading and attendant call lights control in conjunction with the Passenger Service System (PSS),
- updated flight and destination information displays in conjunction with the Passenger Flight Information System (PFIS),
- video images of the NLG and MLG in conjunction with the Taxiing Aid Camera System (TACS) on the A340-500/600
- video images from the landscape cameras (Optional),
- telephone capability in conjunction with the Passenger Air-to-ground Telephone System (PATS).

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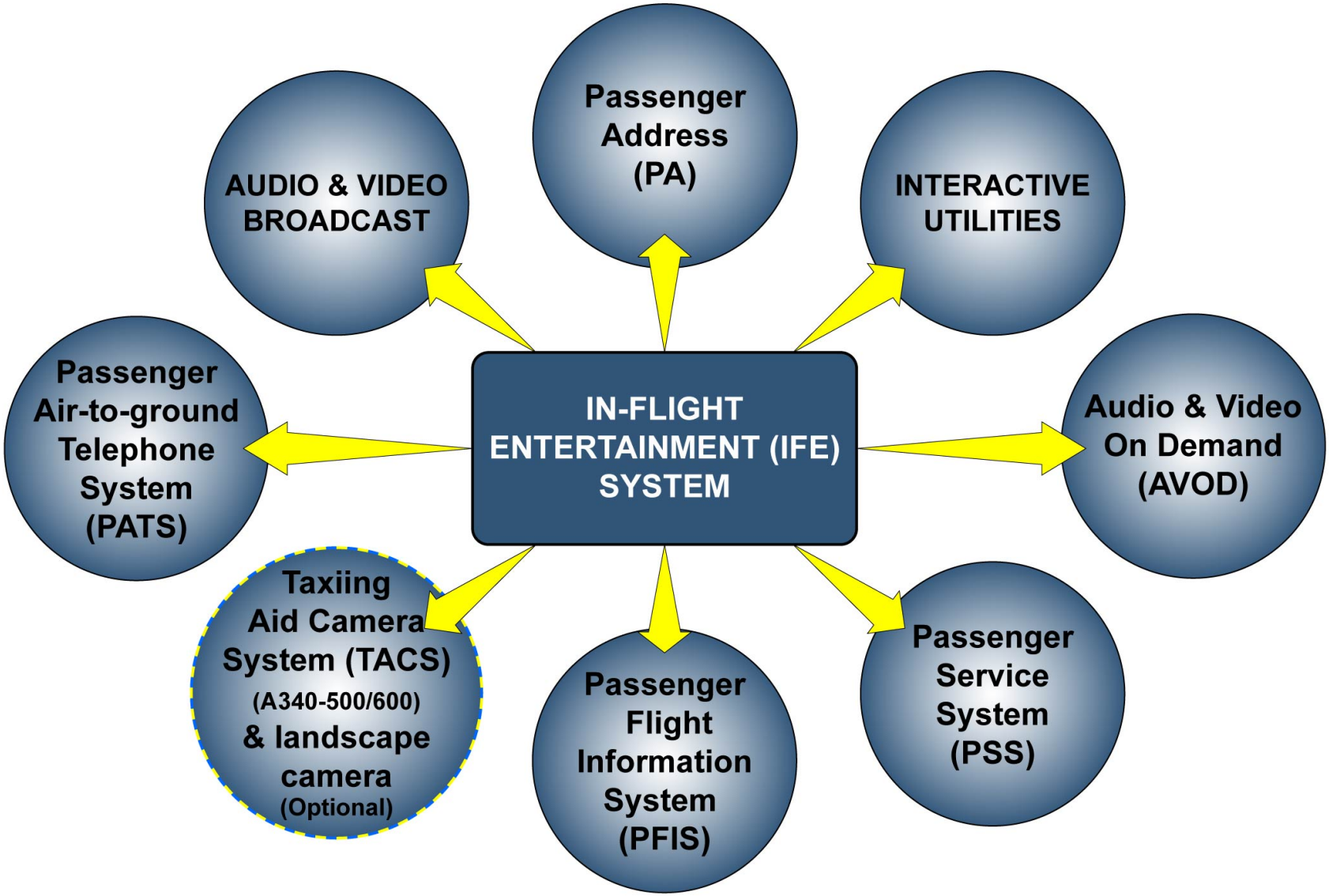

INTRODUCTION

IFE SYSTEM D/O (THALES) (3)

SYSTEM ARCHITECTURE

The IFE system architecture covers the following three main areas:
- the In-Flight Entertainment Center (IFEC),
- the Video Control Center (VCC),
- the cabin related network.

The IFE system gives and sends audio/video signals from IFE center to each passenger seat.
The Audio/Video On Demand (AVOD) is used for individual selection of programs displayed on individual video screens controlled by the Passenger Control Unit (PCU).
Pre-recorded Video Programs are also transmitted to overhead or wall mounted monitors from various video sources (VTR, DVD players, servers). The related sound is distributed to the passenger headsets and/or cabin loudspeakers that are part of the CIDS/PA system.
Interactive functions are also available from the passenger seat (games, duty free, passenger survey).
Passenger payment can be arranged by using credit card reader integrated in the seat.

IFE CENTER

The IFE center, installed in the avionics compartment, contains different type of equipments such as:
- system controller (Audio/Video Controller (AVC)),
- file servers (Digital Server Units (DSU)),
- interface unit (ETHERNET Switching Unit (ESU)),
- audio/video sources (VTR, DVD player),
- miscellaneous equipment (PFIS, PRAM, CTU,...).

The IFE can be installed on 2 racks. The internal arrangement of the racks depends on the configuration selected by the operator.

VIDEO CONTROL CENTER (VCC)

The Video Control Center (VCC) contains the IFE system controls such as:
- IFE Cabin Management Terminal (CMT),
- audio/video sources (VTR, DVD Player),
- printer unit,
- credit card reader,
- keyboard,
- plugs/parts.

The VCC can be installed in different areas (stowage or galley).
Due to technical constraints (VCC power consumption) the location in the passenger compartment may be limited.
The RJ45 plug is used in Maintenance mode for software loading.
The USB port is used also in maintenance mode (small software) or entertainment mode for peripheral connection (Keyboard).

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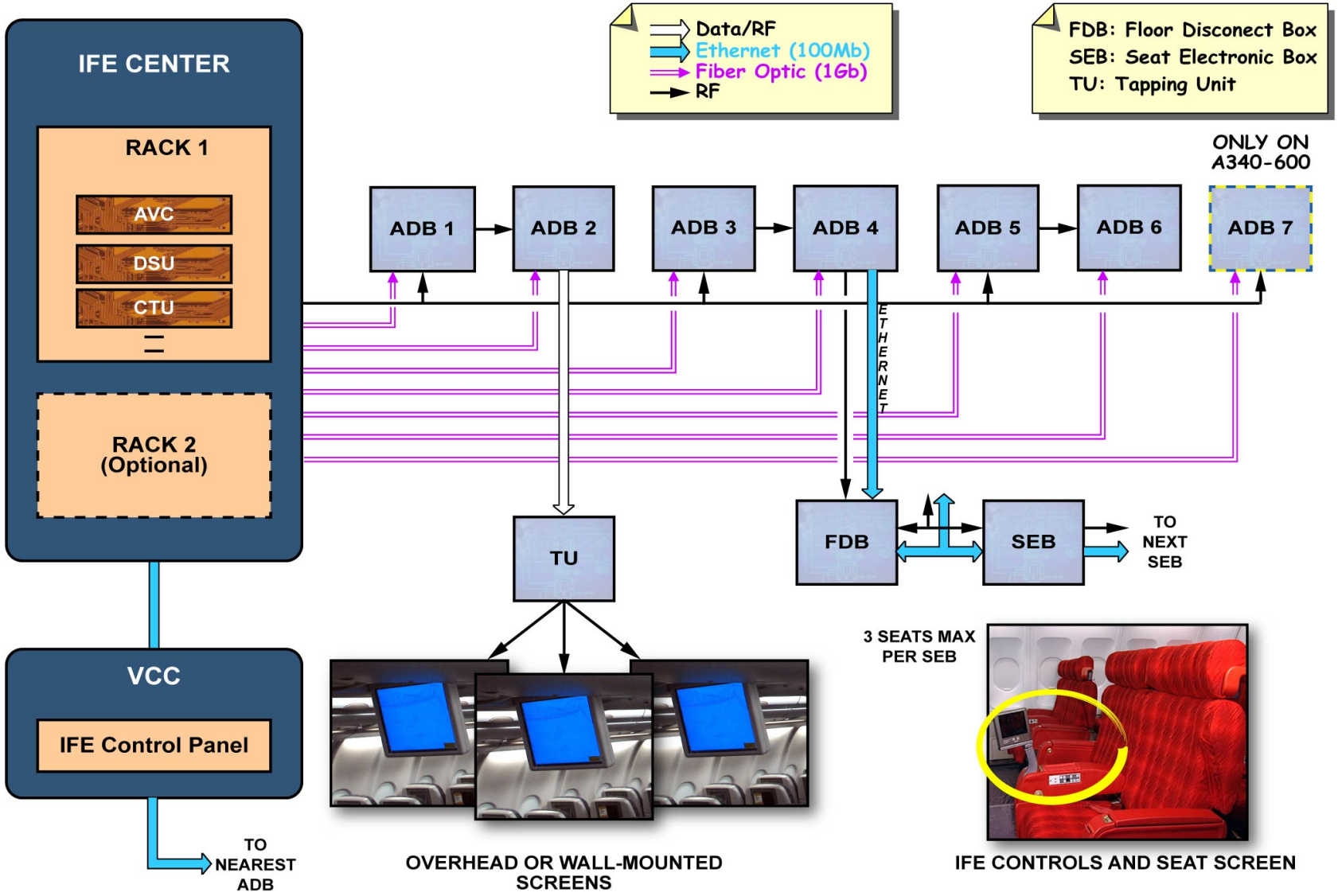

SYSTEM ARCHITECTURE ... VIDEO CONTROL CENTER (VCC)

IFE SYSTEM D/O (THALES) (3)

IFE COMPONENT DESCRIPTION

AUDIO VIDEO CONTROLLER (AVC)

The Audio Video Controller (AVC) is the main controller for the PES. It is used as an interface between VCC and cabin components and other aircraft system (CIDS, landscape camera). The AVC has 6 Ethernet signal transmission ports for high-speed data transfer to/from PES components. The AVC receives audio/ video signals from the server (DSU-AM6-12) and modulates them onto RF signal to the passenger seat.
Passenger Service System (PSS) signals (Attendant Call/Reset, reading light control) and PA analog signal are sent from the AVC to the CIDS.

DIGITAL SERVER UNIT AM6-12 (DSU-AM6-12)

The Digital Server Unit AM6-12 (DSU-AM6-12) is the storage unit for audio/video broadcast (Airline video, News,...).
It also supplies Boarding Music (BMG), PRAM and PFIS.

ETHERNET SWITCH UNIT (ESU)

The Ethernet Switch Unit (ESU) is used as a central connection point between all the PES LRUs.
The Local Area Network (LAN) is an Ethernet data bus that transmit LRU control and condition data from one LRU to the other.
The ESU receives Ethernet signals sent around the LAN and makes sure that they are routed to the applicable LRUs.

DIGITAL SERVER UNIT (DSU-D2)

The Digital Server Units (DSUs) are used to store MPEG files for the AVOD.

AREA DISTRIBUTION BOX (ADB)

The Area Distribution Boxes (ADBs) installed in the cabin ceiling are used for routing received RF Audio/Video and Ethernet/AVOD signal transmission.

FLOOR DISCONNECTION BOX (FDB)

The Floor Disconnection Boxes (FDBs) installed below the cabin floor, are used to route RF Audio/Video and Ethernet/AVOD data between the ADB and the Seat Electronic Boxes (SEBs). The FDB divides the signal to supply two outputs. One for each of 2 seat columns.

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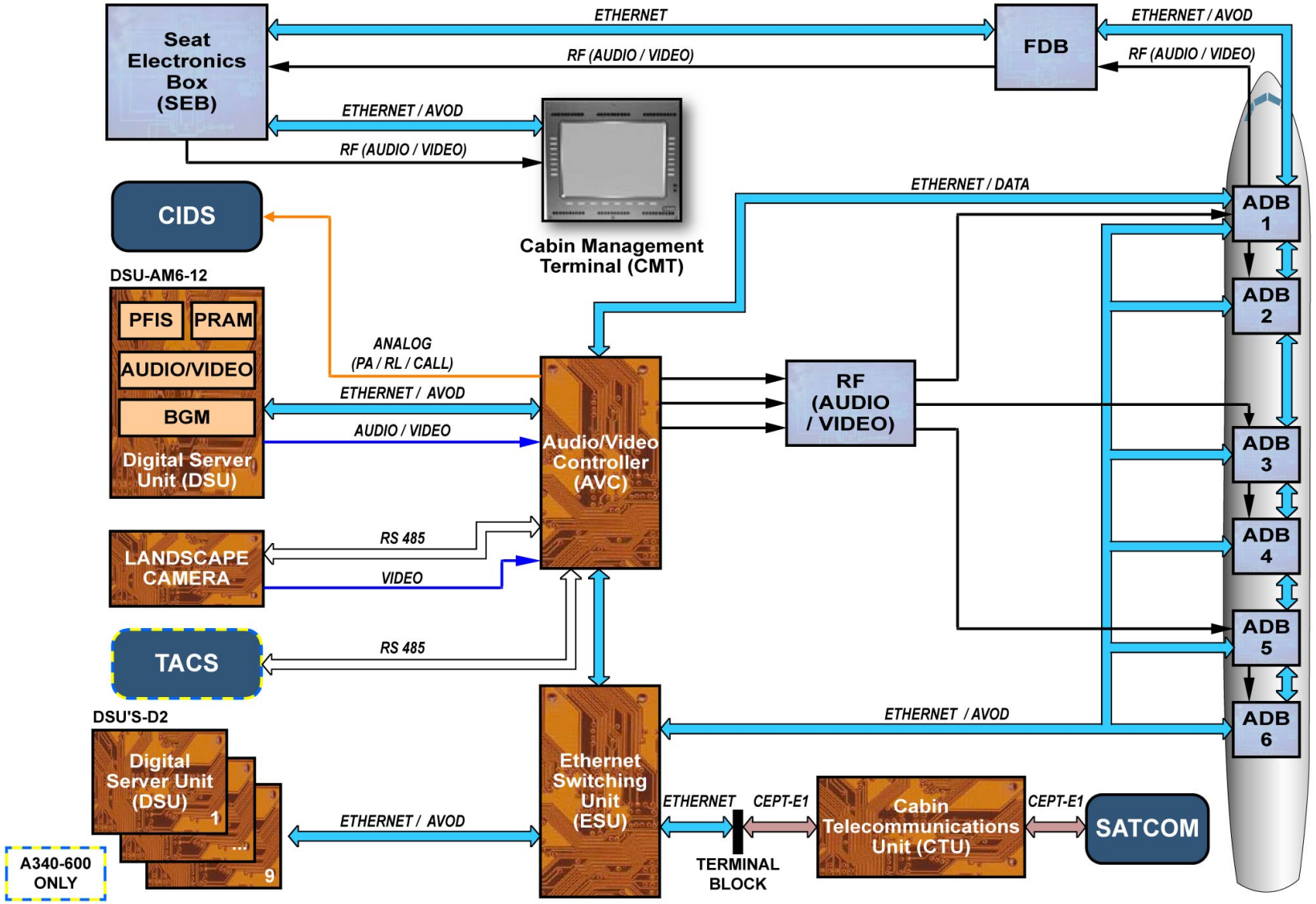

IFE COMPONENT DESCRIPTION - AUDIO VIDEO CONTROLLER (AVC) ... FLOOR DISCONNECTION BOX (FDB)

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IFE SYSTEM D/O (THALES) (3)

POWER SUPPLY

The seat IFE components are powered from the Seat Power Supply System (SPSS).
It will be possible to switch off the IFE system and the SPSS from the cockpit and the VCC.
The IFE system is supplied through the FWD and aft cabin C/B panels.
Three PAX SYS ON/OFF switches located in the cockpit on the overhead panel, in the VCC and on the Flight Attendant Panel (FAP) are used to cut off the power supply to the IFES. To maintain passenger comfort, two additional P/Bs (IFEC SMOKE/OFF and VCC SMOKE/OFF) are installed in the cockpit overhead panel (272VU). These P/Bs are used by the crew to cut off electrical power of both IFE compartments in case of smoke detection and loss of ventilation, without the need to cut off the power supply to all passenger systems.
The Electrical Load Management Unit (ELMU) (on the A340-500/600 only) and the COMMERCIAL cockpit switch can also control the Remote Control Circuit Breakers (RCCBs) related to the IFES.
The VCC is directly connected to the cabin C/B panels. It has a MAIN switch, which cuts off the supply of all the IFE related systems.
The overhead network is supplied through the TUs and the video on enhanced ADBs on demand.
The seat network is supplied through the Master Control Units (MCUs) and the Power Floor Disconnect Boxes (PFDBs). Moreover each seat has C/Bs. The MCUs (BFE) supply 115VAC/ 400 Hz power to the in-seat equipment and are used for power management of seat electrical functions.
The in-seat C/Bs increase the maintainability and make more flexibility in the IFES operation. Indeed, the Portable Electronic Devices (PEDs) power may be switched off, from the cockpit or the FAP, while maintaining other seat capabilities operative.
The RJ45 plug installed in the seat is used for laptop connection (110V AC / 60Hz).

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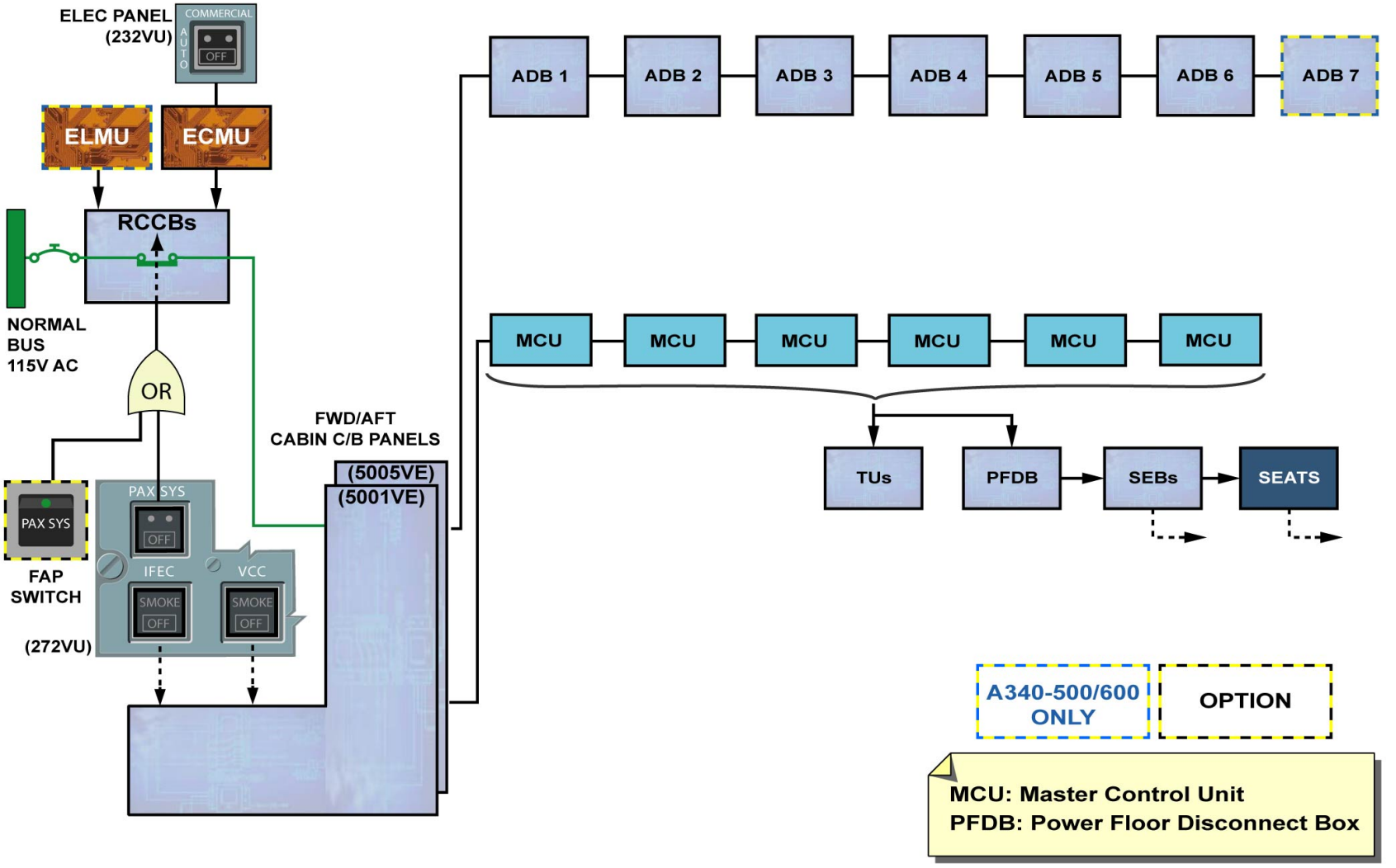

POWER SUPPLY

IFE SYSTEM D/O (THALES) (3)

SYSTEM INTERFACE

The IFE system also interfaces with the following A/C systems:
- Passenger Air-to-ground Telephone System (PATS),
- Passenger Flight Information System (PFIS),
- Taxi Aid Camera System (TACS) (A340-600 only),
- Landscape Camera (Option).

PATS SYSTEM DESCRIPTION

The A/C can have different telecommunication systems:
- wall mounted and in-seat telephone,
- digital printer / Fax machine, cordless telephone,
- Cabin Wireless Unit (CWLU) which is a part of Fly Smart - ATA 46.

The Passenger Control Unit (PCU) has a keyboard, a microphone and a loudspeaker like a conventional telephone handset.
The Seat Electronic Box (SEB) acquires the passenger telephone.
The SEB sends the request to the Ethernet Switch Unit (ESU) via the cabin network.
The ESU processes the request and sends it to the Cabin Telecommunications Unit (CTU).
The communications and data transmission received by the CTU are connected to CEPT-E1 protocol in the ESU zone controller (same process for wall-mounted telephone via IFE). A telephone communication is then opened using the SATCOM system.

NOTE: CEPT-E1 (Conference European Post and Telecommunications Standard E1) is a digital telecommunication protocol.

The CTU concentrates voice data, credit card data and telephone number data from cabin seats as well as ground telephone voice data to transmit to the passenger handset.

The PATS is designed to operate like a public phone, the passenger gets additional information or instruction by voice or messages on the telephone handset window. A passenger application is available via IFE server with SATCOM that enables them to send and receive e-mails or SMS.

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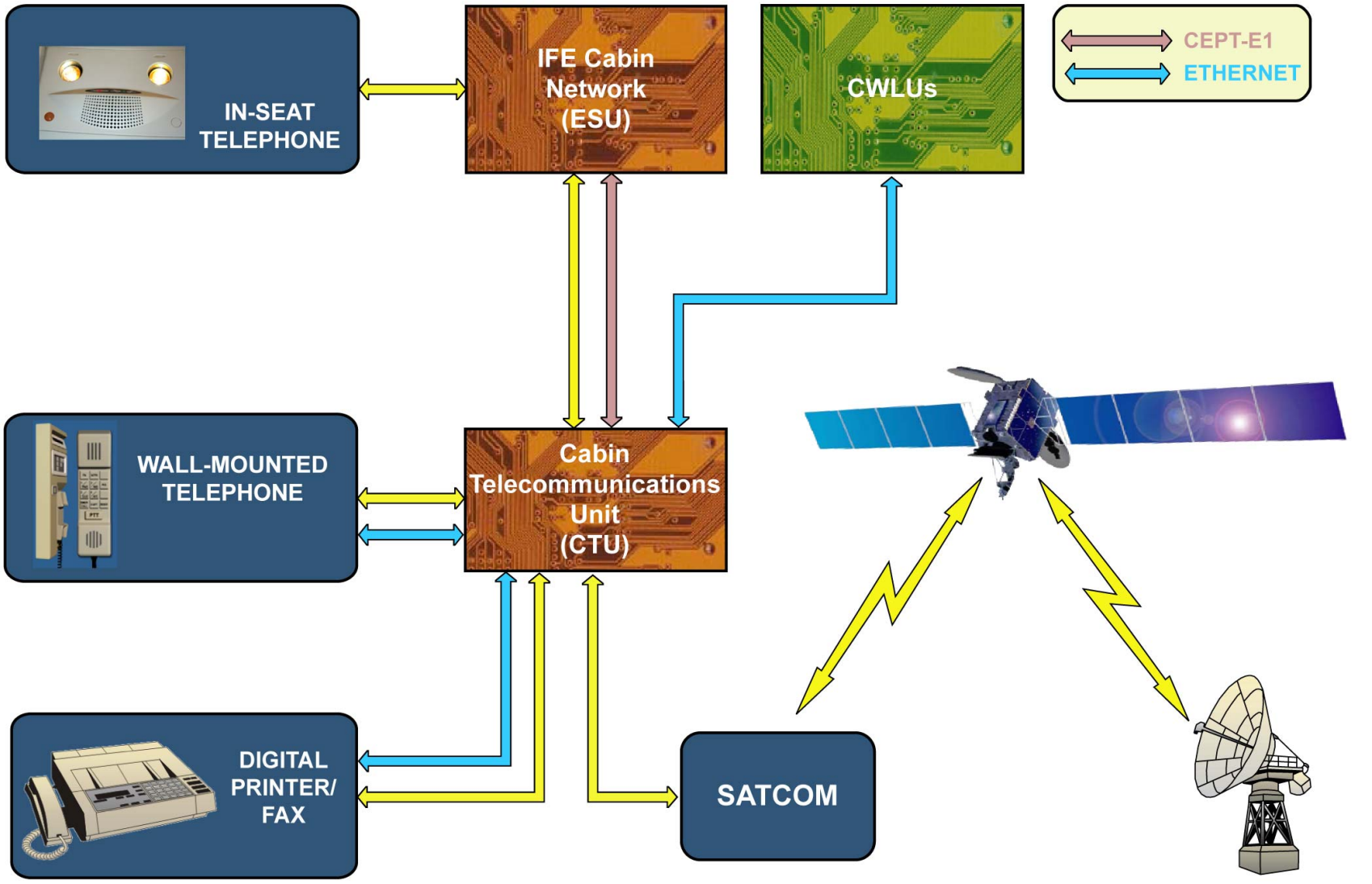
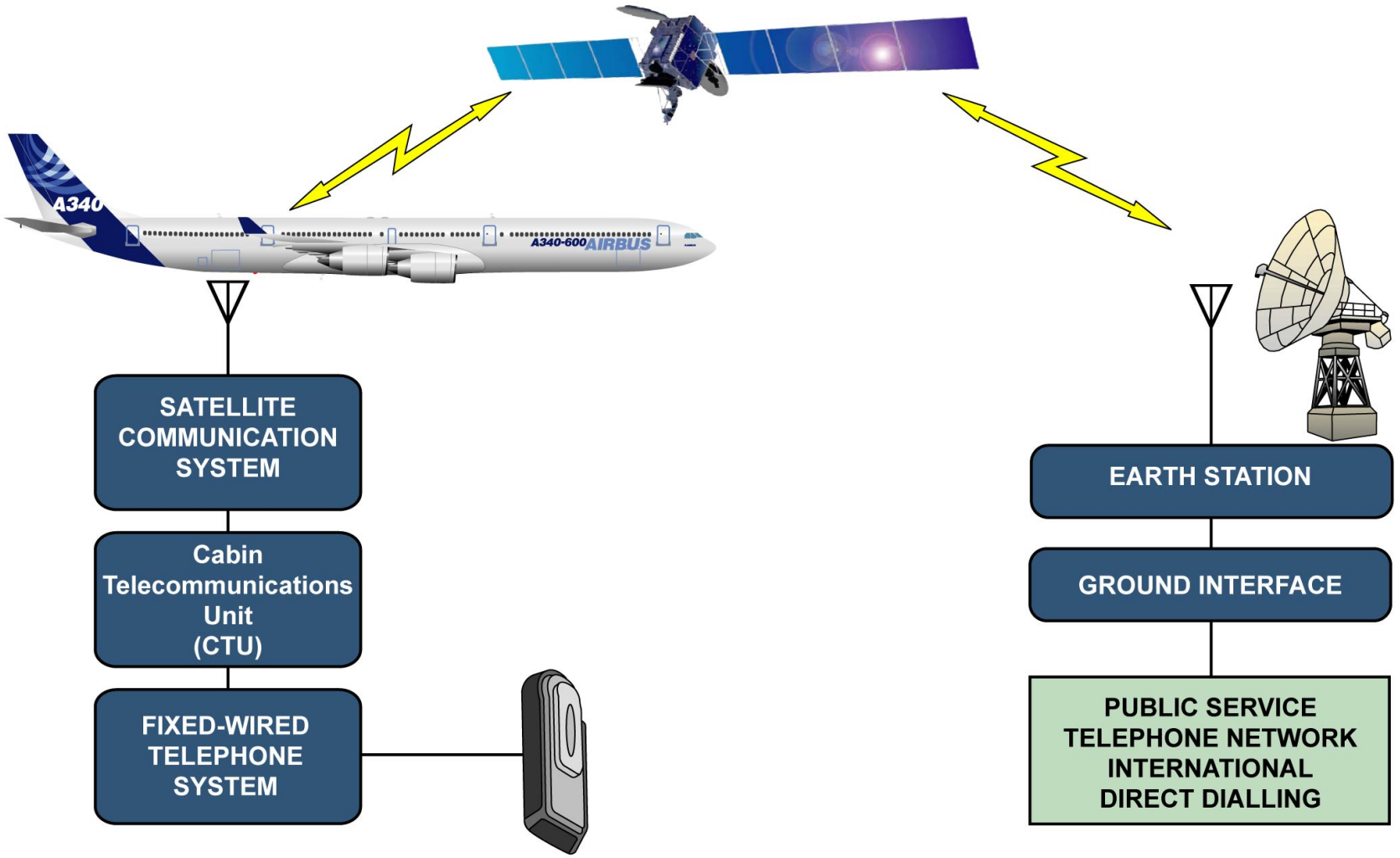


SYSTEM INTERFACE - PATS SYSTEM DESCRIPTION



SYSTEM INTERFACE - PATS SYSTEM DESCRIPTION

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IFE SYSTEM D/O (THALES) (3)

SYSTEM INTERFACE (continued)

PFIS SYSTEM DESCRIPTION

The Passenger Flight Information System (PFIS) continuously gives updated flight and destination to the passengers via IFE video monitors. The PFIS function is achieved via software loaded in the IFE server installed in the rack 1 (DSU-AM6-12).
Depending on the A/C position, the DSU gives video sequences to the passengers (For example A/C mock-up, twenty overflown points of interest, altitude, temperature etc...).
PFIS data from DSU are sent through the audio/video Controller (AVC), which can be broadcasted on the overhead or wall-mounted screens or on the passenger screens.

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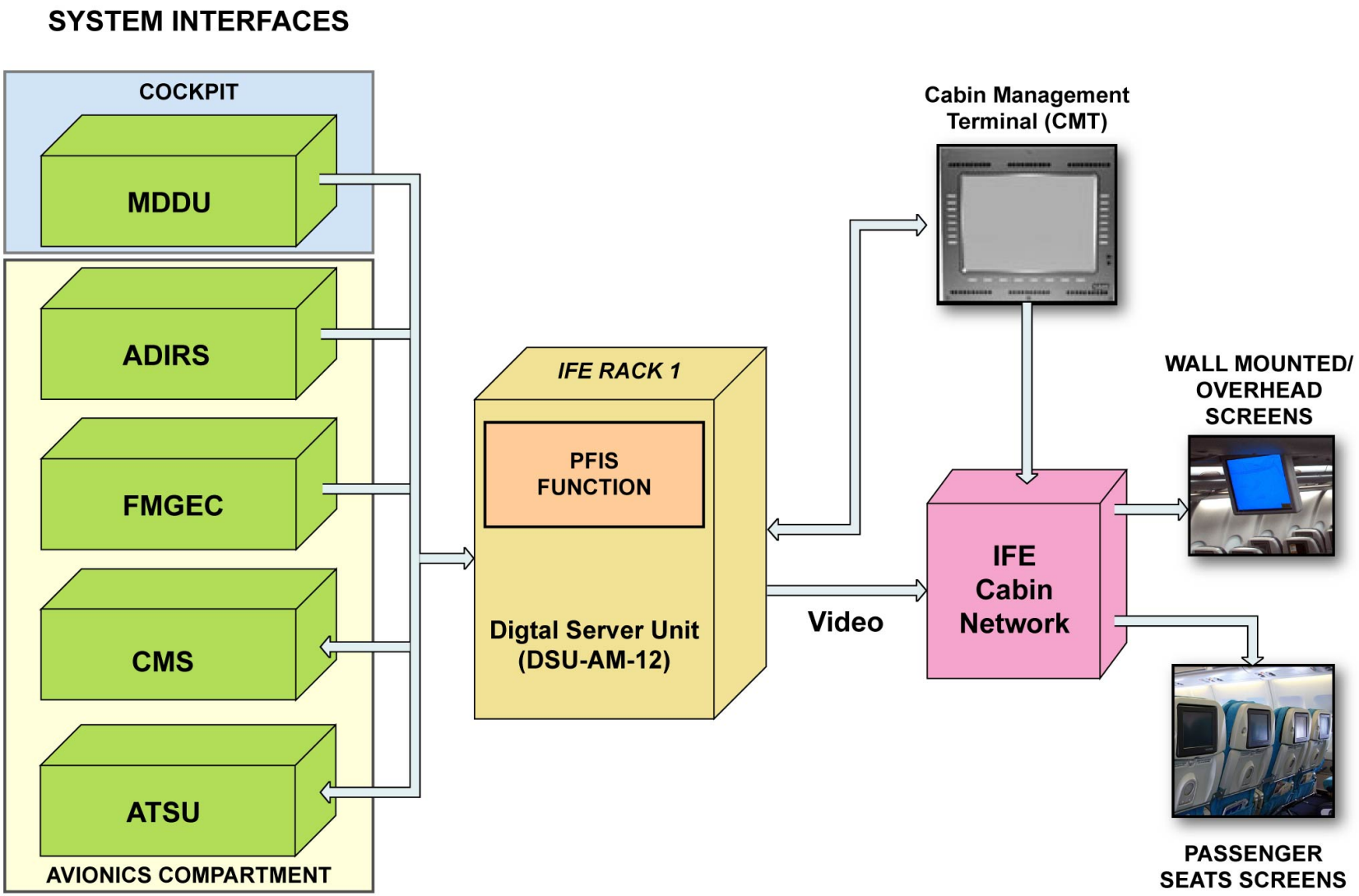

SYSTEM INTERFACE - PFIS SYSTEM DESCRIPTION

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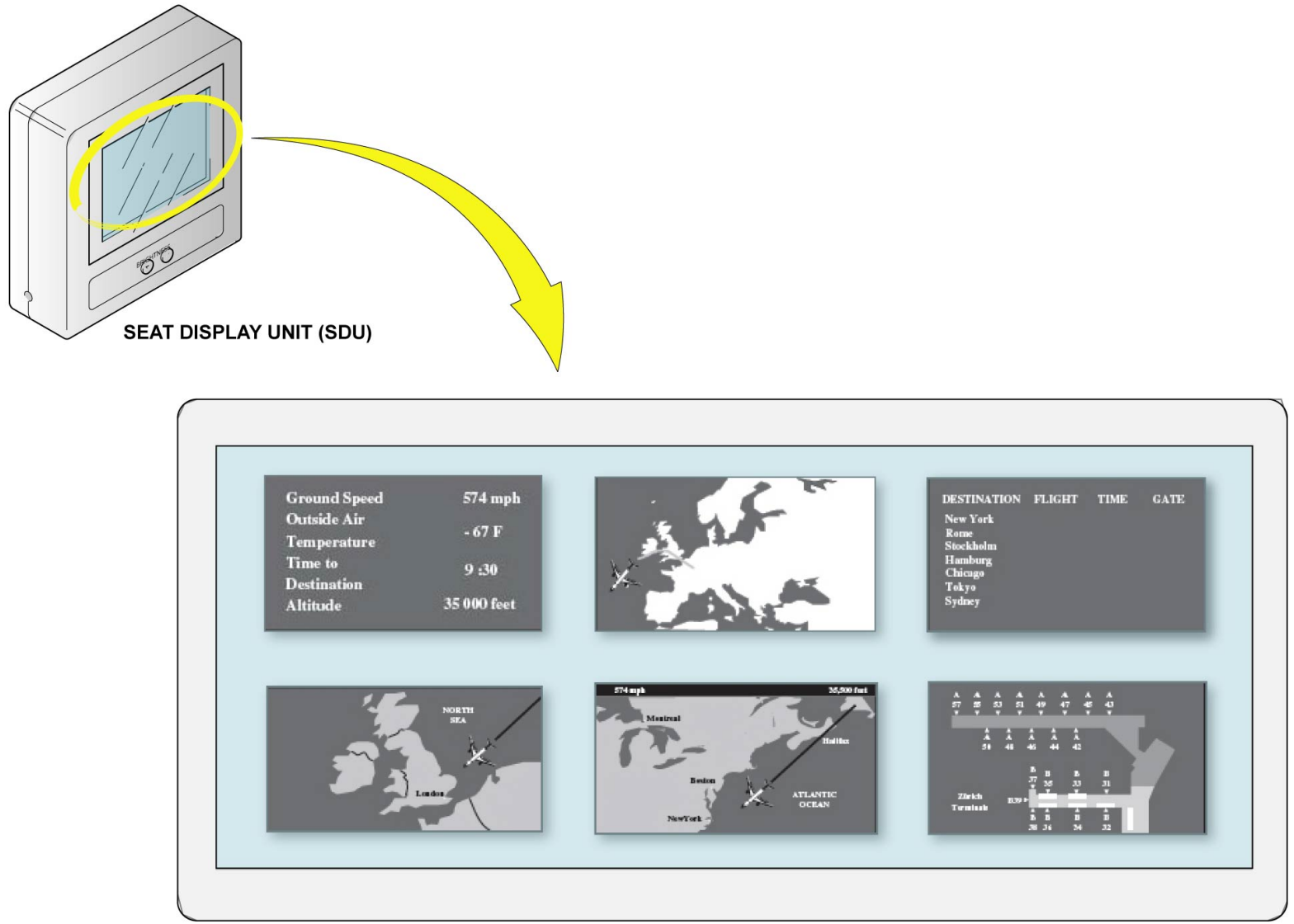

SYSTEM INTERFACE - PFIS SYSTEM DESCRIPTION

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IFE SYSTEM D/O (THALES) (3)

SYSTEM INTERFACE (continued)

TACS (A340-600 ONLY)

The IFES system enables an interface with the TACS. For taxiing functions, the TACS enables the video images of the NLG and MLG to be displayed on the CAPT and F/O Primary Flight Displays (PFDs) and the ECAM SD.

Video from the TACS can be requested either by the cabin crew from the VCC, or by the passengers from the PCU or the tactile screen. In both cases, the AVC acquires the request and sends it to the CIU.

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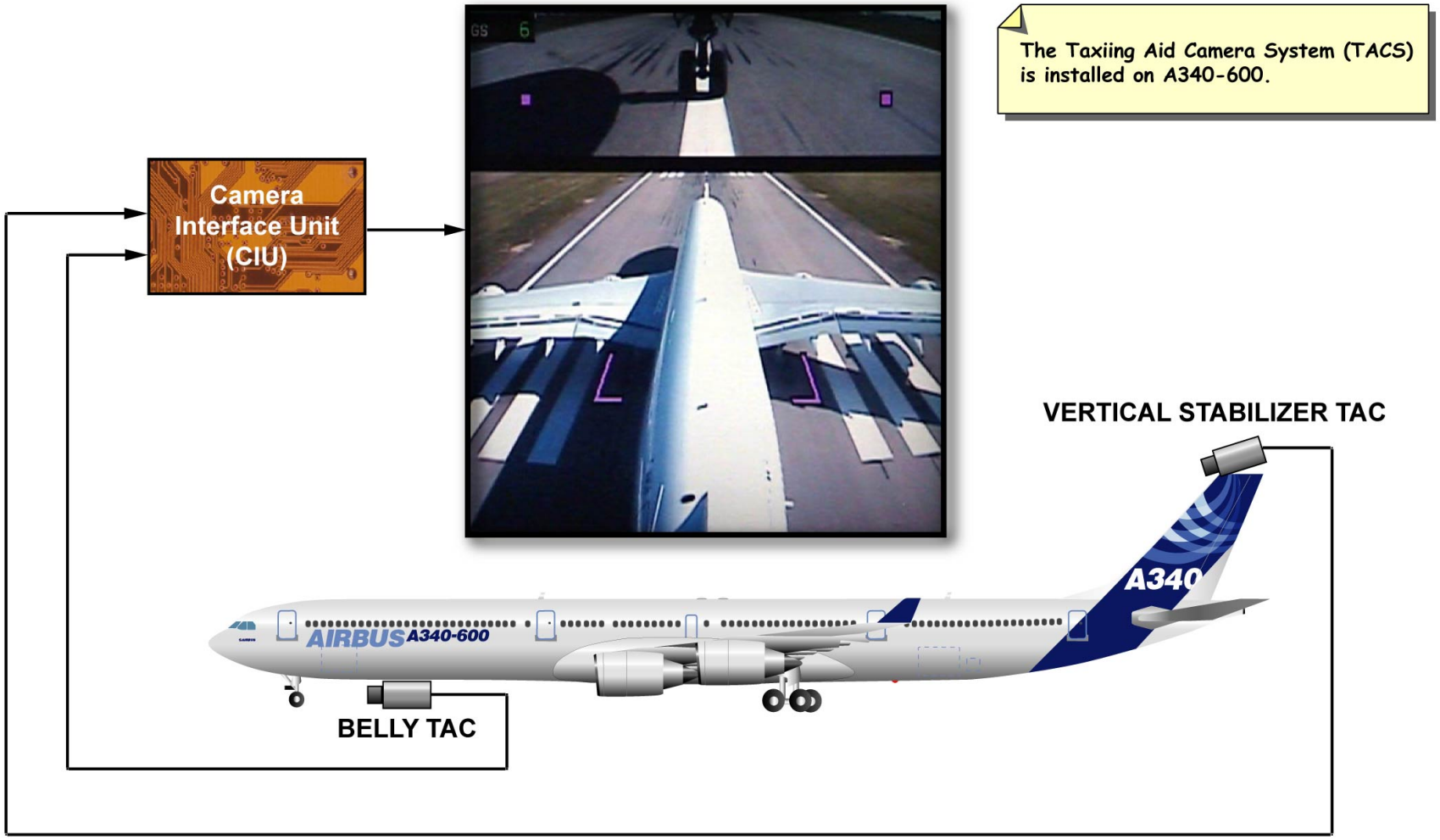

SYSTEM INTERFACE - TACS (A340-600 ONLY)

IFE SYSTEM D/O (THALES) (3)

SYSTEM INTERFACE (continued)

LANDSCAPE CAMERA (OPTION)

The Landscape Camera System has a Video Camera Module (VCM).
The VCM is composed of:
- 2 video cameras in the bottom part (VCM-L),
- the electronics devices in the top part (VCM-H),

The VCM-H processes the video signal from the cameras and controls them to interface with the A/C.
Depending on the landing gear condition (downlocked or retracted), the video channels of the landscape camera system show either the horizontal view or both horizontal and vertical views.
A master switch, on the cockpit overhead panel is installed in order to stop the video output of the cameras (in case of turbulence).

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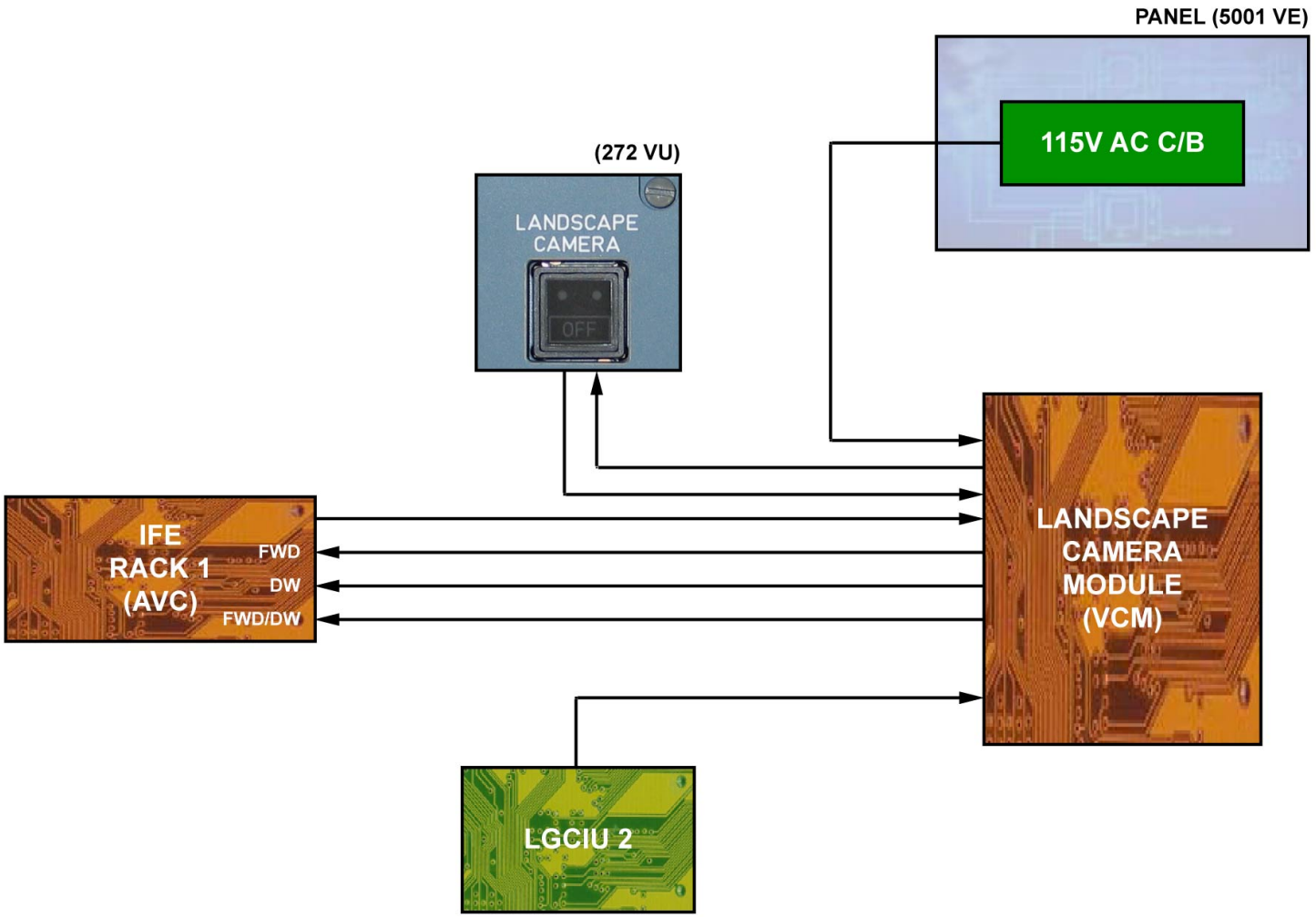

SYSTEM INTERFACE - LANDSCAPE CAMERA (OPTION)

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IFE SYSTEM D/O (THALES) (3)

BITE

The BITE data are stored in the AVC memories. Specific interactive maintenance menus are directly accessible from the VCC using the Cabin Management Terminal (CMT).
The CMT is the primary Passenger Entertainment System (PES) interface for the flight attendants and the maintenance personnel. The CMT is a graphic interface and supplies the subsequent following functions:
- Control of video distribution to cabin zones,
- Cabin configuration management,
- Control of peripherals, such as preview of video and audio programs, monitor ON/OFF control, monitor lockout, airshow operation and VTR control,
- Start of BITE requests to all connected LRUs,
- Software load and configuration reports,
- Player controls, entertainment and passenger address, movie and video game lockout,
- Engineering test.

An internal Bite is done automatically at power up and can be manually initiated from the CMT.
A function test is also made continuously during PES operation.

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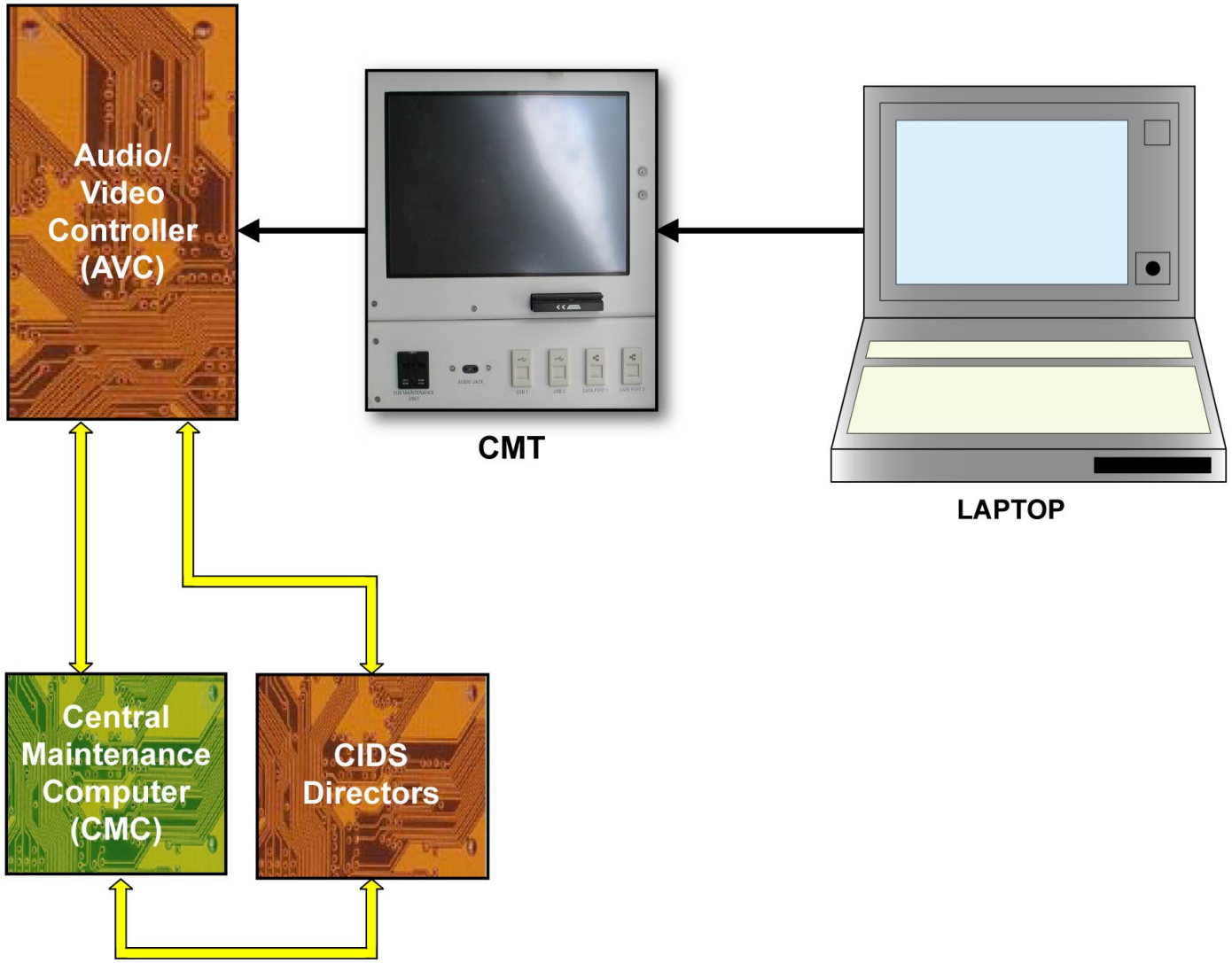
Audio/
Video
Controller
(AVC)
CMT
LAPTOP
Central
Maintenance
Computer
(CMC)
CIDS
Directors

BITE

COCKPIT VOICE RECORDING D/O (3)

GENERAL

The objective of this topic is to describe in detail the principle and the architecture of the Cockpit Voice Recording (CVR) system.

PRINCIPLE

The Solid State Cockpit Voice Recorder (SSCVR) is designed to record crew conversations and communications on SOLID STATE MEMORIES, in flight or on ground, and to preserve them in case of an A/C accident.
The recordings are made in SOLID STATE MEMORIES which basically provide a 30-minute recording of continuous operation, or 2 hours with memory extension (+ 90 minutes). All data recorded 30 minutes or 2 hours before is automatically erased by the recording of new data.

SYSTEM ARCHITECTURE

The CVR system consists of:
- a remote microphone to record direct conversations and warnings in the cockpit,
- a CVR control unit, located in the cockpit on the overhead panel. The CVR control unit provides power for the area microphone, filters and pre-amplifies the audio signals from the area microphone and allows the control and monitoring of the SSCVR through the ERASE and TEST P/Bs.
- an SSCVR, located in the aft pressurized equipment bay. The SSCVR records all the transmitted and received radio communications, the Passenger Address (PA) announcements, the flight interphone conversations between flight crew members, all the aural warnings and the direct conversations in the cockpit.
- a logic relays A/C wiring system, composed of relays, the function of which is to allow the power supply of the SSCVR for normal, test or erase operation, under specific conditions.

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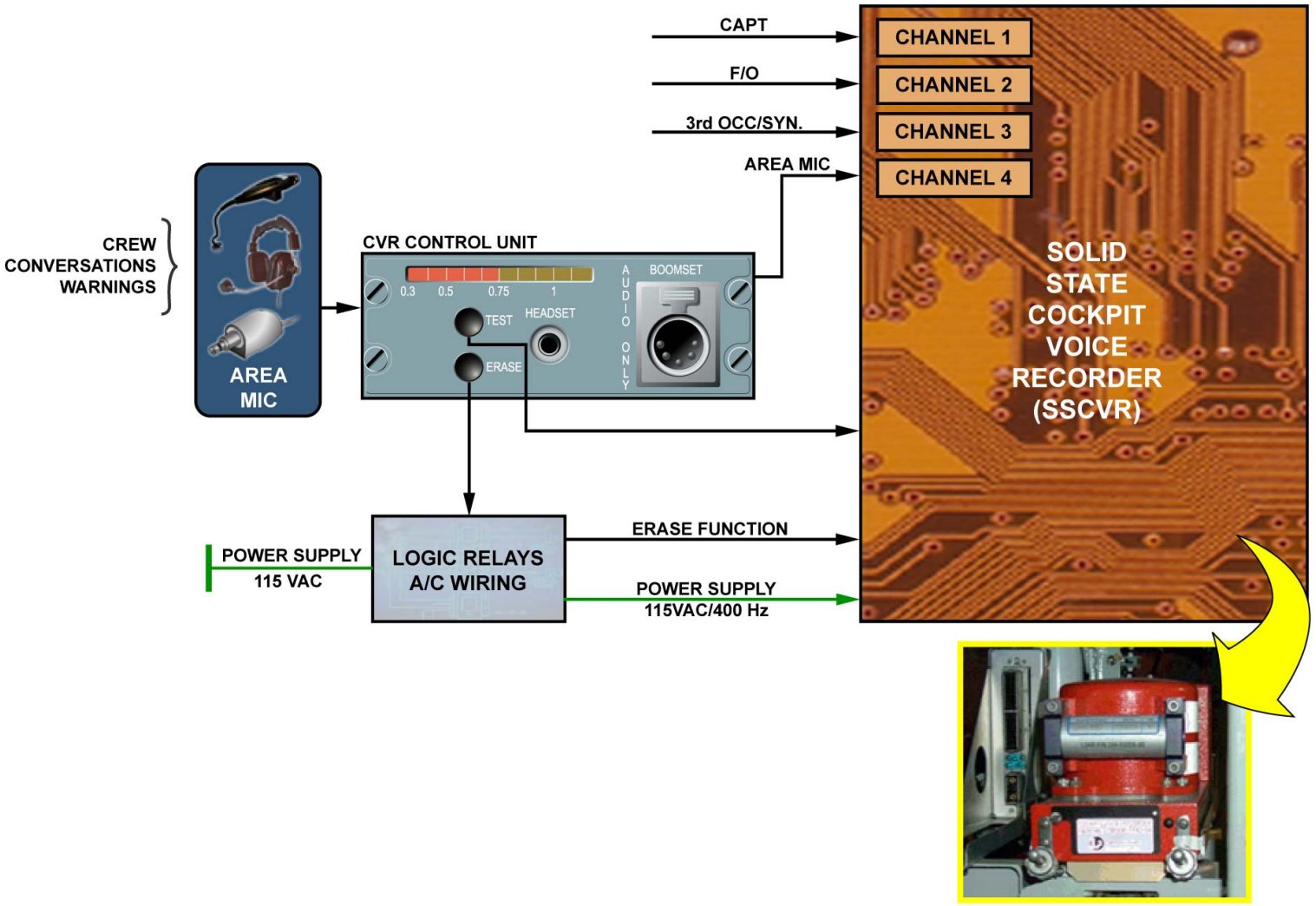
PRINCIPLE AND ARCHITECTURE OF THE COCKPIT VOICE RECORDING SYSTEM



GENERAL - PRINCIPLE & SYSTEM ARCHITECTURE

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COCKPIT VOICE RECORDING D/O (3)

OPERATION CONTROL AND INDICATING

The recording system consists of four channels:
- channels 1, 2 and 3 have a narrow band and allow the recording of the audio signals from/to the CAPT, F/O and 3rd occupant via the Audio Management Unit (AMU).
- channel 4 has a wide band and allows the recording of the crew conversations or warnings via the CVR control unit.
- the SSCVR is synchronized with the solid state flight data recorder by means of an audio signal corresponding to the Greenwich Mean Time (GMT) sent by the Flight Data Interface Unit (FDIU) to the audio system and received by the SSCVR on the third occupant channel.

A strap fitted on the rear connector of the AMU enables the selection between the FAA and the CAA recording options.
The FAA requires that all the transmitted or received communications be recorded. In transmission, the side tone only is recorded. The CAA requirements are almost the same as the FAA requirements, except that, in addition to the FAA requirements, the noises picked up by the boomset and oxygen mask microphone must be recorded, even when the Push To Talk (PTT) function is not activated.

POWER SUPPLY

To power the SSCVR, on ground or in flight, two modes are available: the automatic and the manual mode.
These two modes are conditioned by the logic relays A/C wiring.
The SSCVR is automatically supplied with 115 VAC/400 Hz, when the A/C is:
- on the ground, during the first 5 minutes of energization of the electrical network,
- on the ground, with at least 1 engine running,
- in flight,
- on the ground, up to 5 minutes after the last engine is stopped.

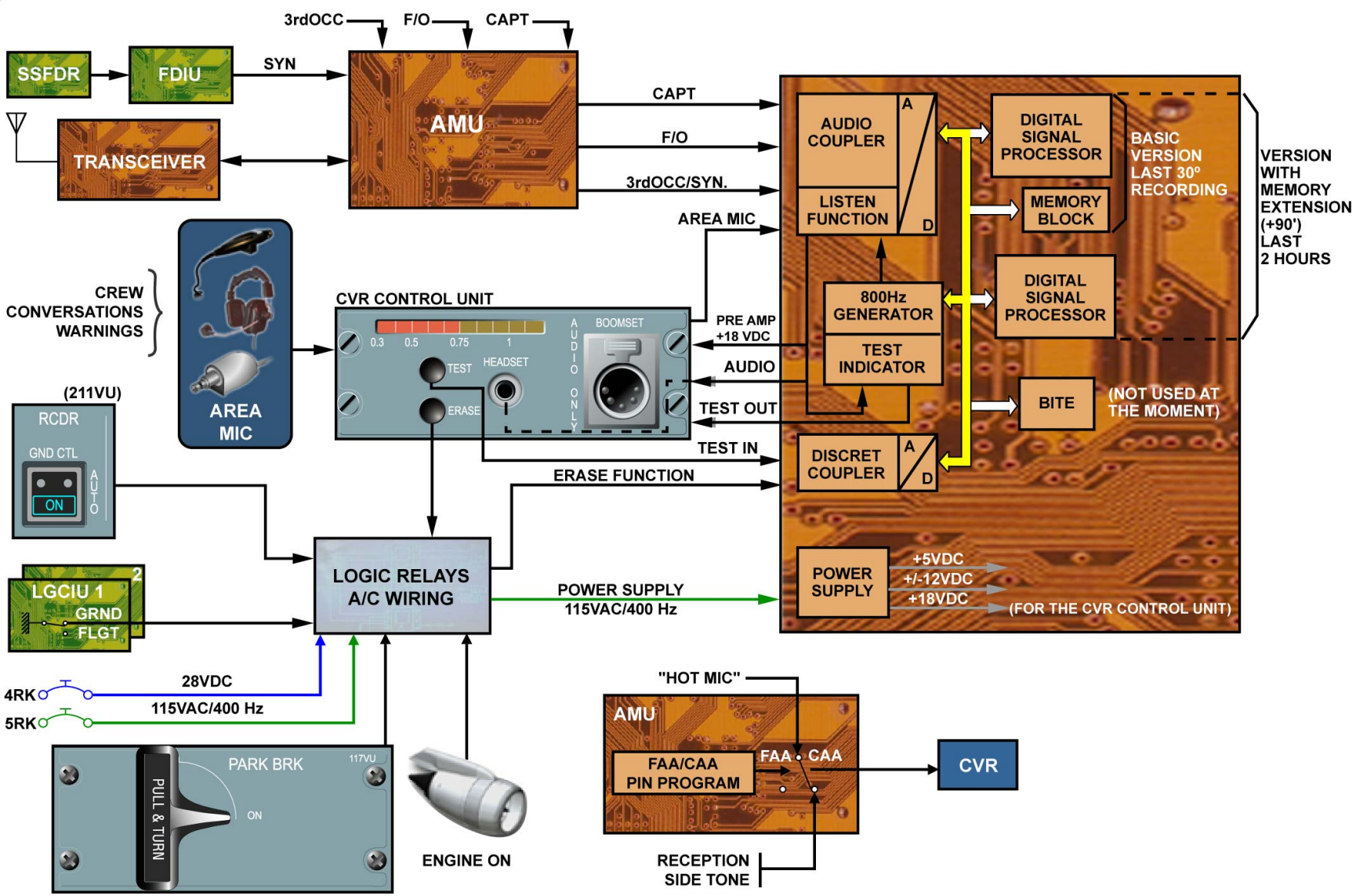
The manual selection of the power supply is done through the ReCorDeR GrouND ConTroL P/B. The manual selection of the SSCVR power supply, on ground only, is used to test the SSCVR for correct operation, to record the checklist before one engine is started or to erase the SOLID STATE MEMORIES, if required.

TEST AND MONITORING

The test and monitoring functions are initiated from the CVR control unit. They can be done on ground or in flight.
The monitoring of the four channels is possible by connecting a headset on the front face of the CVR control unit. An 800 Hz tone is heard for 1 to 2 seconds. The display is used for signal level control.

ERASE FUNCTION

The erase function is manually initiated from the CVR control unit by pressing the ERASE P/B for at least 2 seconds. The erase function is completed within 5 seconds of activation.
The PARKing BRAKE must be on, the L/G down and compressed.



OPERATION CONTROL AND INDICATING - POWER SUPPLY ... ERASE FUNCTION

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COCKPIT DOOR SURVEILLANCE SYSTEM D/O (3)

GENERAL

The Cockpit Door Surveillance System (CDSS) is related to the Cockpit Door Locking System (CDLS) and uses cameras to prevent a hijacking attempt and protect the flight compartment against an intrusion. The CDSS images are displayed in the cockpit to let the flight crew identify a person in front of the cockpit door and to survey the hidden cross section in the door number 1 area.

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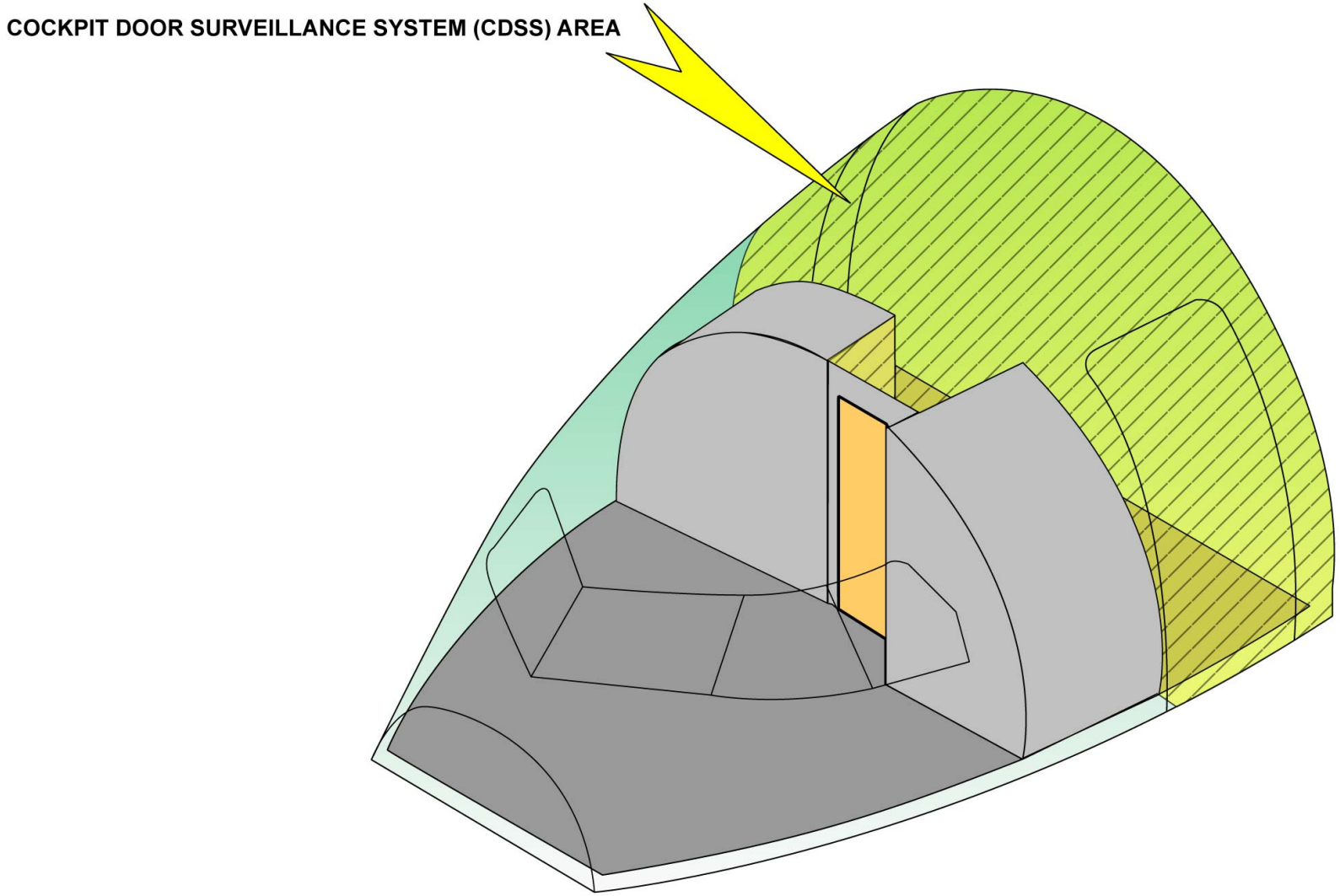

GENERAL

COCKPIT DOOR SURVEILLANCE SYSTEM D/O (3)

SYSTEM CONFIGURATION

Two types of CDSS can be installed. The first configuration has the following components:
- 3 cameras installed in the ceiling panels in the cockpit entrance and the door 1 area,
- 1 LCD mounted on the rear cockpit wall, with a system controller,
- 1 COCKPIT DOOR VIDEO P/B installed on the overhead panel,
- 1 VIDEO P/B installed on the pedestal, and,
- 1 CDSS "IN USE" indication light, installed above the FAP on the left door 1 area.

The second configuration has the following components:
- 3 cameras installed in the ceiling panels in the cockpit entrance and the door 1 area,
- 1 COCKPIT DOOR VIDEO P/B installed on the overhead panel,
- 1 CAMera SELection P/B,
- 1 CKPT ENTRY rotary switch installed on the pedestal, and,
- 1 system controller, installed in the avionics bay, to process and display images on the lower ECAM Display Unit (SD).

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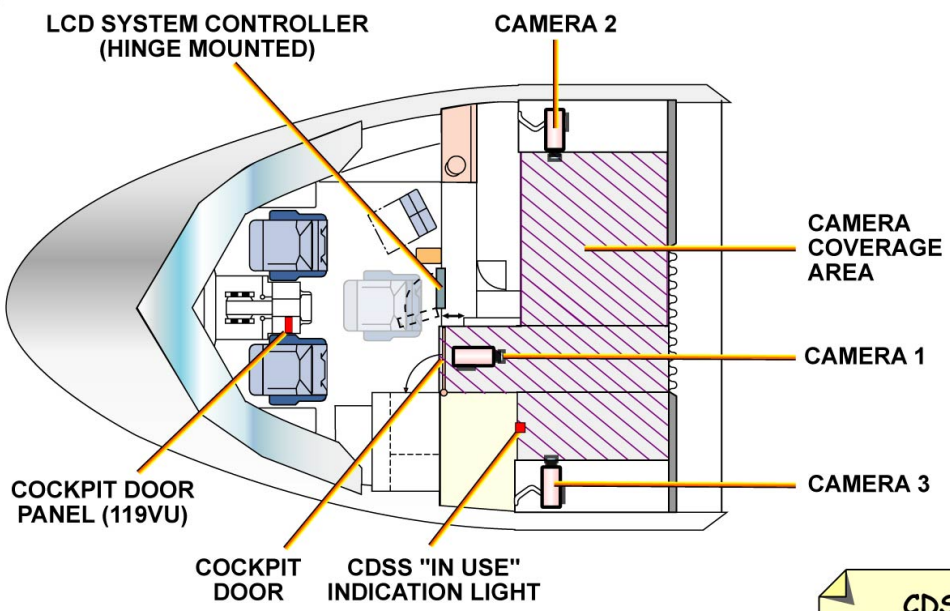

CDSS configuration 1

COCKPIT DOOR PANEL (119VU)

COCKPIT DOOR
VIDEO PANEL (271VU)

LCD SYSTEM CONTROLLER

PICTURE FROM CAMERA 1

PICTURES FROM CAMERAS 2 & 3

CAMERA 1

CAMERA 2 OR CAMERA 3

SYSTEM CONFIGURATION

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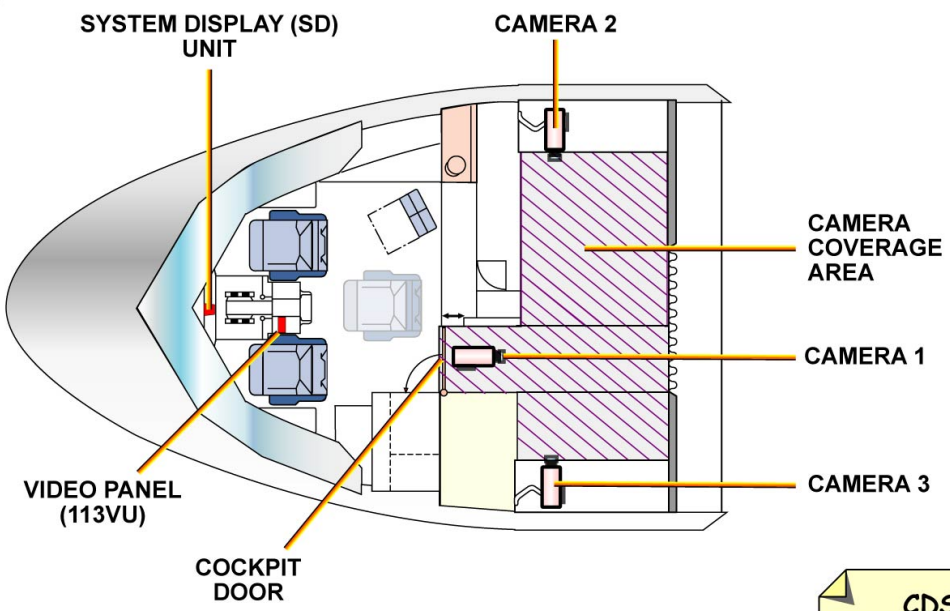

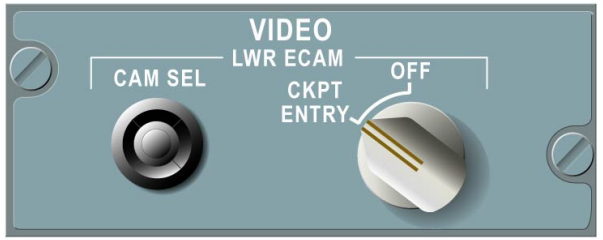

VIDEO PANEL (113VU)

CDSS configuration 2

COCKPIT DOOR VIDEO PANEL (271VU)

SYSTEM DISPLAY (SD)

SYSTEM CONTROLLER

CAMERA 1

CAMERA 2 OR CAMERA 3

SYSTEM CONFIGURATION

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COCKPIT DOOR SURVEILLANCE SYSTEM D/O (3)

SYSTEM DESCRIPTION - CONFIGURATION 1

CAMERAS

Each "NTSC video format" black and white video camera is hidden in a flight attendant working light housing and has an infrared light to get personal recognition. One video camera installed above the cockpit door helps you to get a clear personal recognition of the person requesting entrance to the cockpit. A second video camera installed in the ceiling of the RH door n°1 and a third one installed in the ceiling of the LH door n°1 let you recognize a person hidden behind the galley and the lavatory wall.

LCD

The pivoting hinge 6.4" LCD with system controller lets the flight crew view the pictures from the cameras. Pictures from the camera 1 are displayed as a full screen whereas pictures from cameras 2 and 3 are displayed as a split screen, LH side for the camera 2 and RH side for the camera 3. On the front face of the LCD, the green LED comes on when the system is operating and this LED flashes when a failure occurs in the system. The white LED is a light sensor, which automatically controls the brightness on the LCD screen.

CONTROL

The CKPT DOOR VIDEO P/B sets the CDSS on or off. The VIDEO P/B lets the flight crew select the picture from camera 1, or from the cameras 2 and 3. It also lets the flight crew put the system into the standby/power save mode (blank screen) when it is pushed and held for two seconds. The LCD also goes into this mode if the system gets no signal from the VIDEO P/B or the CDLS for one minute. If the CDSS receives an entry request discrete from the CDLS, the LCD automatically comes on (if the LCD was on the standby/power save mode) and shows the picture from the camera 1. The CDSS "IN USE" indication light comes on when a camera is selected.

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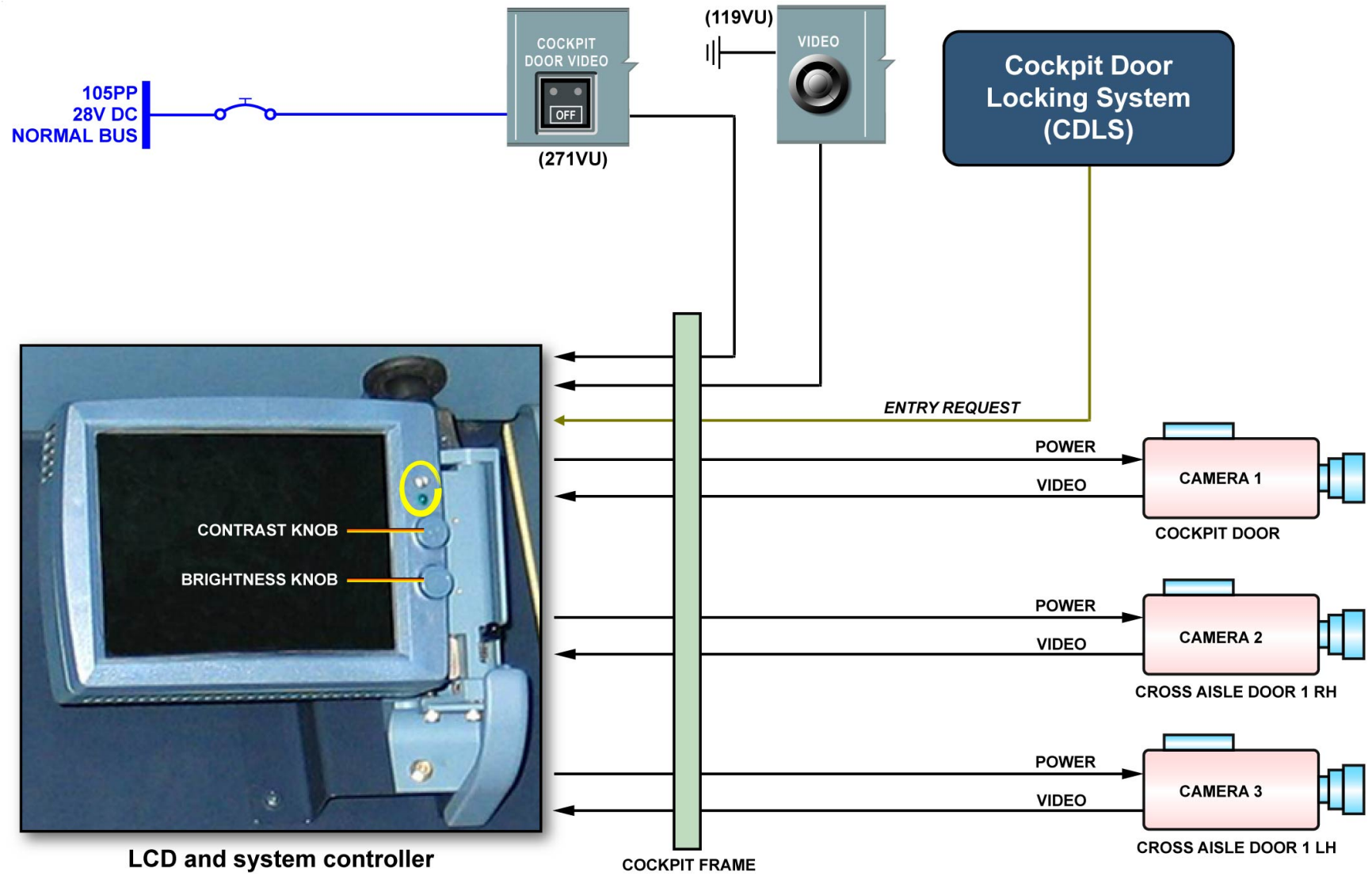

SYSTEM DESCRIPTION - CONFIGURATION 1 - CAMERAS ... CONTROL

COCKPIT DOOR SURVEILLANCE SYSTEM D/O (3)

SYSTEM DESCRIPTION - CONFIGURATION 1 (continued)

BITE

When a failure is detected in the CDSS, a message is shown on the LCD monitor in white text and the green LED is flashing. A failure history can be displayed on the LCD for 60 seconds by pushing the VIDEO P/B for more than 10 seconds. To delete the failure history memory the CDSS must be reset. To reset the CDSS:
- push the COCKPIT DOOR VIDEO P/B off then on and push and hold the VIDEO P/B for 5 seconds,
- after 5 seconds the message "CLEAR FAILURE HISTORY ? YES" appears on the LCD screen,
- push VIDEO P/B and wait for 15 seconds.

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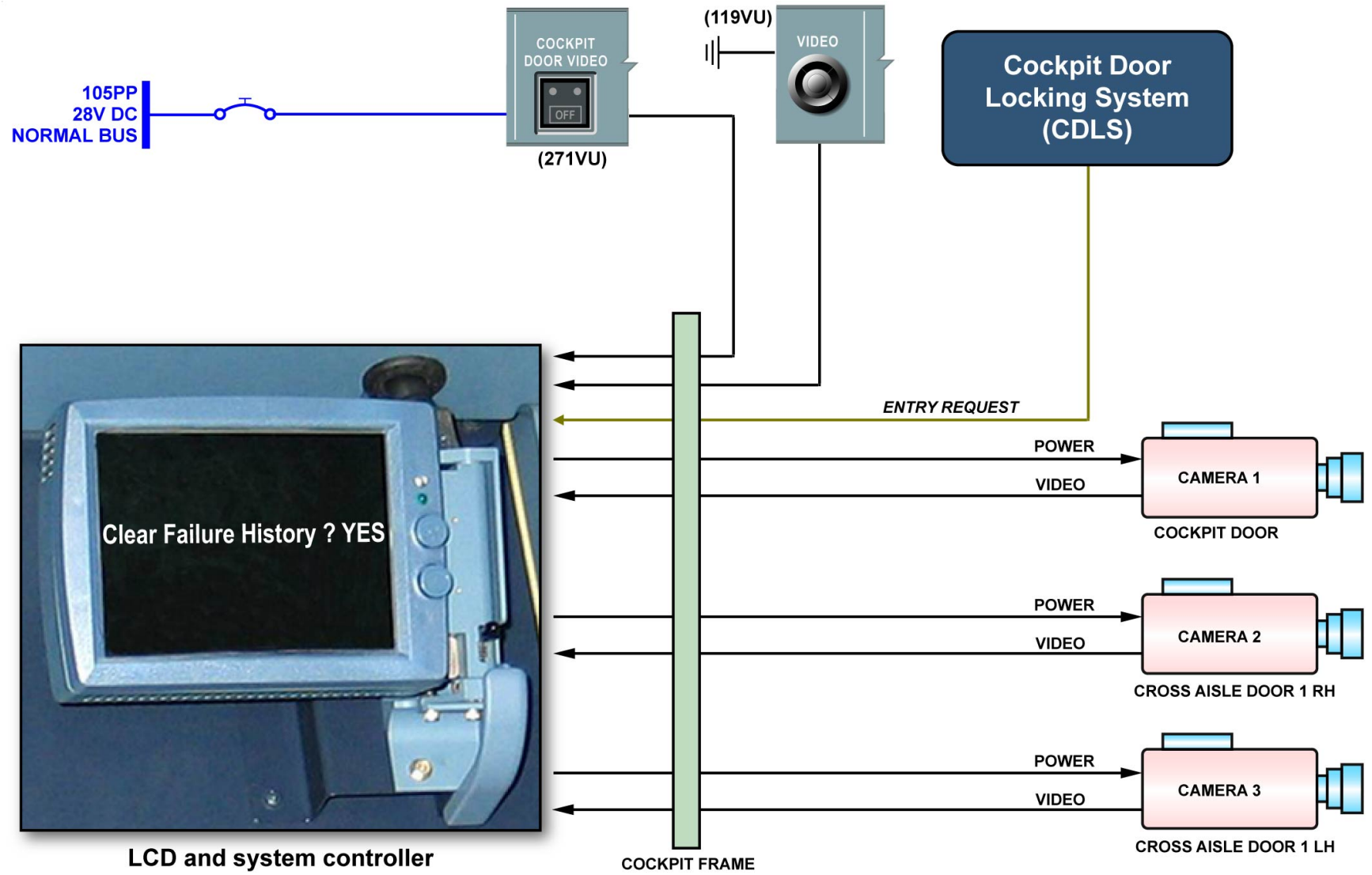

SYSTEM DESCRIPTION - CONFIGURATION 1 - BITE

G9409341 - GAUT0T0 - FM23DF000000001

COCKPIT DOOR SURVEILLANCE SYSTEM D/O (3)

SYSTEM DESCRIPTION - CONFIGURATION 2

CAMERAS

Each "NTSC video format" black and white video camera is hidden in a flight attendant working light housing and has an infrared light to get better personal recognition. One video camera installed above the cockpit door helps you to get a clear personal recognition of the person requesting entrance to the cockpit. A second video camera installed in the ceiling of the RH door n°1 and a third one installed in the ceiling of the LH door n°1 let you recognize a person hidden behind the galley and the lavatory wall. The pictures from the cameras are displayed on the SD. The pictures from the camera 1 are displayed as a full screen whereas pictures from cameras 2 and 3 are displayed as a split screen, LH side for the camera 2 and RH side for the camera 3.

SYSTEM CONTROLLER

The system controller is supplied by 115V AC through the COCKPIT DOOR VIDEO P/B, and gives 12V DC electrical power to energize the cameras. The system controller receives input signals from the cameras and also monitors the status of the CDSS. It processes the signal from the cameras and gives a video feed signal to the SD.

NOTE: On A340-600, the Video Multiplexer Unit (VIMU) is fitted if both TACS (Taxiing Aid Camera System) and CDSS are installed. The VIMU enables the video pictures from the CDSS or the TACS to be displayed on the SD.

CONTROL

The CKPT DOOR VIDEO P/B sets the CDSS on or off. The CAM SEL P/B lets the flight crew select the picture from camera 1, or from the cameras 2 and 3 on the SD unit. The LoWeR ECAM CKPT ENTRY rotary switch has two positions: CKPT ENTRY and OFF. A signal is sent to the Display Management Computers (DMCs) and to the system controller when the LWR ECAM rotary switch is set to the CKPT ENTRY position. If the CDSS receives an entry request discrete from the CDLS, the pictures from camera 1 are automatically displayed on the SD unit (if the LWR ECAM rotary switch is set to the CKPT ENTRY position).

BITE

If a failure occurs in the CDSS, the related message is displayed on the SD unit. The detected failure is stored in the system controller and the failure is also sent to the Central Maintenance System (CMS) through the ARINC 426 data bus.

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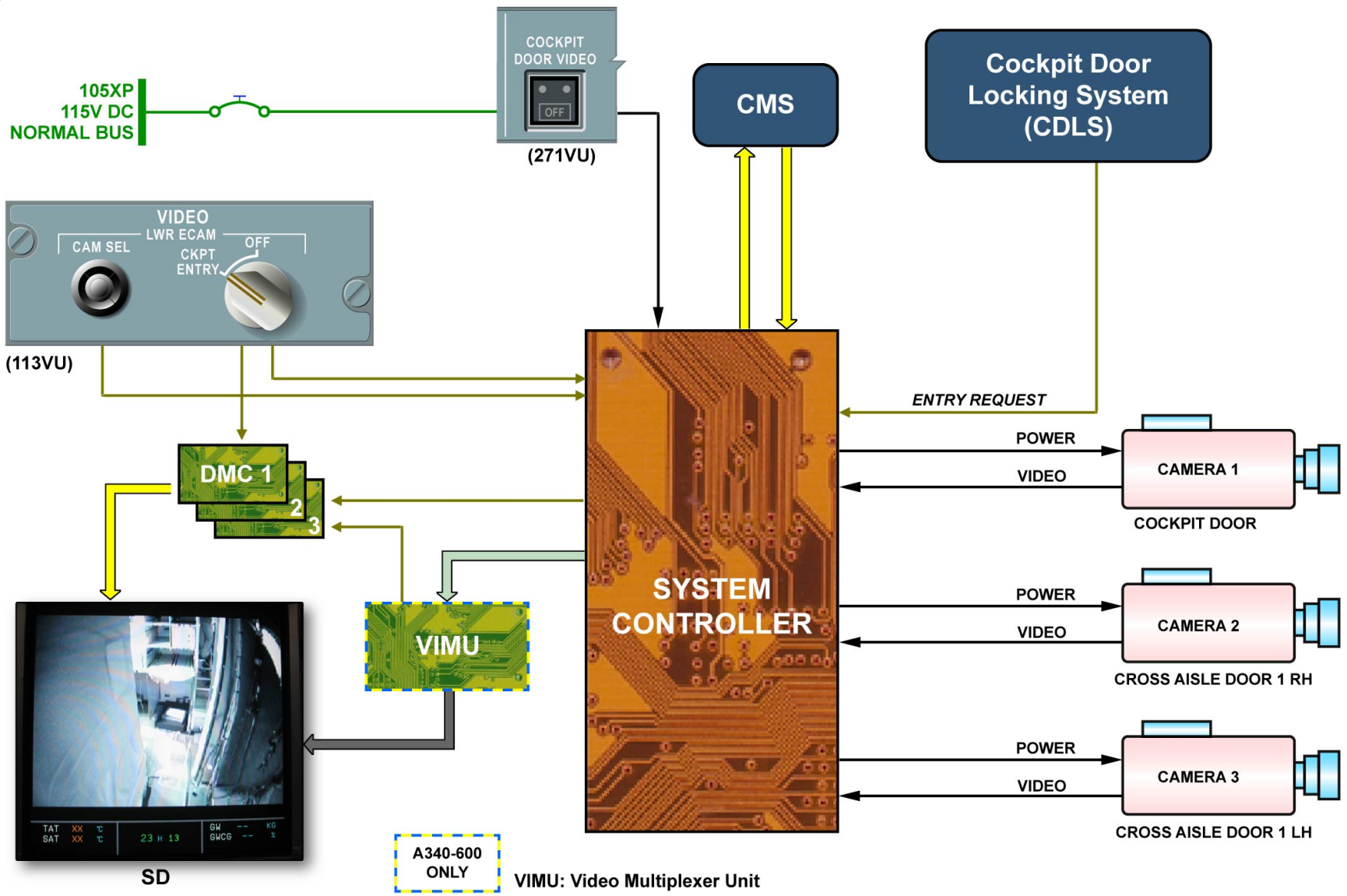

SYSTEM DESCRIPTION - CONFIGURATION 2 - CAMERAS ... BITE

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